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HERPOTRICHIA AND ITS SEGREGATES

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SUMMARY

The North American species described in *Herpotrichia* are more suitably disposed in five genera and four families: *Herpotrichia* (Massarinaceae), *Neopeckia* (Coccoideaceae), *Lojkania* (Fenestellaceae), *Pseudotrichia* and *Byssosphaeria* (Melanommataceae). New combinations are proposed in *Lojkania* for *Sphaeria decorticata* Cooke & Harkness, *Psilosphaeria melasperma* Cooke, *Amphisphaeria nuda* Ellis & Everhart, *A. separans* Ellis & Everhart, *Herpotrichia striatispora* Papendorf & von Arx, *Melanopsammina utahensis* Petrak and in *Byssosphaeria* for *Cucurbitaria alnea* Peck, *Herpotrichia jamaicana* Sivanesan, *Sphaeria salebrosa* Cooke & Peck, *Herpotrichia schiedermayeriana* Fuckel, *Sphaeria semen* Cooke & Peck, and *S. xestothele* Berkeley & Curtis. Two species are included from Venezuela, *Pseudotrichia mamillata* sp. nov. and *P. pachnostoma* (Berkeley & Curtis in Cooke) comb. nov., as well as one from Jamaica, *Byssosphaeria oviformis* sp. nov. *Herpotrichia erythrinae* Huguenin is transferred to *Byssosphaeria*.

North American species that key to *Herpotrichia* in recent treatments (Bose, 1961; Müller and von Arx, 1962; Sivanesan, 1972; Luttrell, 1973; von Arx and Müller, 1975) exhibit a diversity of features. It becomes obvious that *Herpotrichia* s. lat. is heterogeneous and that several genera are recognizable. The variations in shape, position and vestiture of ascomata and in characteristics of asci, pseudoparaphyses and ascospores, are such that it seems essential to re-establish several genera now included in the synonymy of *Herpotrichia*. I present here an account of the North

American species, and remarks on some extralimital taxa, utilizing five genera, arranged in four different families, two each in the Pleosporales and the Melanommatales.

Herpotrichia s. str. bears many resemblances to *Massarina* with numerous "curtainlike" pseudoparaphyses visible above the relatively short asci, ascospores hyaline and one septate, finally becoming light brown and several septate, usually constricted in each hemispore as well as at the primary septum, and usually surrounded by a gel coating. Taxa of *Herpotrichia* seem suitably placed in the family Massarinaceae as an erumpent-superficial, tomentose group of species.

Neopeckia, with the sole species *N. coulteri*, is also pleosporaceous but differs from *Herpotrichia* in several respects. The globose ascomata have a short broad papilla and are borne in and under abundant subiculum of narrow hyphae; the asci are cylindric and occupy much of the centrum space; the ascospores are broadly ellipsoid ovoid, reddish to dark brown, and usually one septate. The fungus presents some problems in disposition and for the present is placed in the Coccoideaceae, a family whose other members are parasitic on leaves of various plants.

The other three genera are melanommataceous, with trabeculate pseudoparaphyses and asci often in a peripheral hymenial layer. *Lojkania* includes species whose ascomata are pyriform with short to elongate beak, or ovoid, and whose ascospores are one septate, brown, ellipsoid. This genus seems best placed in the Fenestellaceae.

The globose and papillate ascomata in species of *Pseudotrichia* are covered by tomentum that is yellowish, green, rusty orange, gray or light brown. Ascospores are fusoid, hyaline becoming light brown, and one to several septate. The species of *Byssosphaeria* have a ± turbinate shape to the ascomata, with rounded or plane apex bearing a minute papilla, and ellipsoid or fusoid ascospores, hyaline soon light clear brown or reddish brown, one or several septate. Both *Pseudotrichia* and *Byssosphaeria* are accommodated in the Melanommataceae.

Herpotrichia Fuckel, Fungi Rhenani exs. no. 2171. 1868, in sched.

Enchnosphaeria Fuckel, Symb. Mycol. p. 146. 1870.

Ascomata immersed erumpent or superficial; separate or gregarious, medium sized, globose or somewhat depressed or pyriform, bases rounded or flattened, apex rounded, short or broadly caplike, opening by broad pore; surface tomentose, at times tomentum short, especially at apex, at sides mingling with and/or forming scanty or abundant subiculum; peridium of pseudoparenchymatous cells, ± equal in width or thickened toward apex; centrum rounded or depressed. Asci bitunicate, basal, clavate or cylindric. Pseudoparaphyses narrowly cellular, numerous above asci and forming a sheet-like layer in section. Ascospores fusoid, ellipsoid or oblong, straight or inequilateral or slightly curved, ends acute or obtuse; hyaline becoming light yellowish brown, dull brown or reddish brown; one septate, median, constricted, often with constrictions in each hemispore and finally developing one or more septa in each hemispore; wall smooth or finely verruculose in age, usually surrounded by gel coating that may be elongated over tips as appendages; contents globular or guttulate; overlapping biseriate or uniseriate in the ascus.

Anamorph: coelomycetous where known, *Pyrenochaeta* or *Phoma* like.

Saprobic on woody or herbaceous substrates.

Type species: *H. rubi* Fuckel = *H. herpotrichoides* (Fuckel) Cannon.

Cannon (1982) established the earliest name for the type species, as Holm (in Farr et al., 1979) did for the earliest date of publication of *Herpotrichia*. *Enchnosphaeria*, typified by *E. pinetorum* (Fuckel) Fuckel, was originally separated on differences in septation of the ascospores, but is in fact not separable from *H. juniperi*.

Key to temperate North American species of *Herpotrichia*

1. Ascomata ± applanate, superficial in ample and widespreading subiculum; typically as "snow mould" on conifer leaves and branches; ascospores 18-27(-34) x 6-9(-12) µm .... *H. juniperi*
1. Ascomata globose, depressed, or pyriform, immersed at first, becoming erumpent superficial, subiculum more restricted, usually as tomentum around individual ascomata 2
    2. Ascomata globose pyriform with broad caplike apex; ascospores fusoid, (21-)24-43 x (4-)5-7.5 µm .... *H. macrotricha*
    2. Ascomata globose depressed 3
3. Ascospores ellipsoid oblong, ends obtuse, 24-31(-38) x 6-10 µm .... *H. symphoricarpi*
3. Ascospores fusoid, ends ± acute, 18-27(-32) x 5-6.5 µm... *H. herpotrichoides*

Other species referred to *Herpotrichia* from extralimital regions include *H. parasitica* (Hartig) E. Rostrup (Tids. Skovbrug 12: 222. 1890). This species is parasitic on leaves of *Abies* in Europe and produces the anamorph *Pyrenochaeta parasitica* Freyer & van der Aa on the same mycelium. A recent redescription is that of Freyer and van der Aa (1975). This fungus appears to be dimeriaceous, with rather thin, soft peridium and septate brown setae. *Herpotrichia villosa* Samuels & Müller (Sydowia 31: 158. 1978) from Brazil produces a *Pyrenochaeta*-like anamorph in culture. *Herpotrichia caesalpiniae* (Doidge) Sivanesan (Mycol. Pap. 127: 15. 1972) is unusual by turbinate shape of ascomata, similar to species of *Byssosphaeria*, but other features are those of *Herpotrichia*; *H. millettiae* Sivanesan (Mycol. Pap. 127: 14. 1972) from Malasia has somewhat the same shape of ascomata and similarly shaped one-septate ascospores. Both *H. yasudae* (Hino) Pirozynski, the type species of *Chaetosphaerulina* Hino, and *H. vermicularispora* (Hino & Katumoto) Pirozynski deviate from *Herpotrichia* in ovoid to barrel-shaped ascomata and elongate-fusoid, multiseptate, hyaline ascospores. *Herpotrichia nigrotuberculata* (Hino & Katumoto) Pirozynski also has vertically elongate ascomata, but with a narrow base, and elongate-fusoid ascospores. These three species appear to belong in *Tubeufia* (Sivanesan, personal comm.). *Herpotrichia pandei* Bose is melanommataceous; the peridium is composed of parallel hyphae at the upper and lower sides, forming platelike areas on the surface. The species is better arranged in *Astrosphaeriella* (cf. Hawksworth, 1981).

Although an exhaustive summary of North American species placed at some time in *Herpotrichia* is not attempted, note is made of the following. *Herpotrichia nicaraguensis* Ellis & Everhart (in C. L. Smith, Bull. Iowa Univ. Lab. Nat. Hist. 2: 400. 1893) with small brown, one-celled ascospores in unitunicate asci belongs in class Ascomycetes. (Central Amer. Fungi, C. L. Smith 8 and Nicaraguan Fungi 77, two parts of holotype, NY). *Herpotrichia purpurea* Ellis & Everhart (Proc. Acad. Nat. Sci. Philadelphia 1895: 415.) is also one of class Ascomycetes. It is a member of the Helotiales, with purplish-brown tomentum and appendages, asci with amyloid apical ring, and hyaline, one-septate, fusoid ascospores. (Washington Flora 344, holotype, NY). *Herpotrichia graminea* Dearness & House (New York State Mus. Circ. 24: 32. 1940) was published without a Latin diagnosis and should be allowed to sink into oblivion. The holotype in NYS (House 820) is very sparse and immature. According to the description, this is probably *H. macrotricha*. *Herpotrichia quinqueseptata* Weir (J. Agric. Res. 4: 252. 1915) was described as differing from *H. nigra (= H. juniperi)* in fusoid ascospores, not constricted at any of the five septa, measuring 28-34 x 7.5-9 µm. From Weir's (1915) illustration, the ascospores are quite different from others in *Herpotrichia*. Seaver (1915) suggested that *H. quinqueseptata* was based upon characteristics of *H. juniperi* but with ascospores of *Mytilidion cf. fusisporum* (Cooke) Saccardo. The ascospores are in agreement with those of *Mytilinidion gemmigenum* Fuckel, of which *M. fusisporum* is a synonym (Zogg, 1962).

Herpotrichia herpotrichoides (Fuckel) Cannon, Trans. Brit. Mycol. Soc. 79: 338. 1982. Figs. 1, 2
Sphaeria herpotrichoides Fuckel, Fungi Rhenani exs. no. 952. 1864, in sched.
Herpotrichia rubi Fuckel, Fungi Rhenani exs. no. 2171. 1868, in sched.
Herpotrichia rhenana Symb. Mycol. p. 146. 1870.

Ascomata 350-650 µm diam, apex rounded, opening by pore; peridium 35-45 µm wide, even in width; tomentum of narrow brown hyphae. Asci 100-160 x 12-15 µm. Ascospores 18-27 (-32) x 5-8 µm, hyaline, dull brown in age, fusoid, 1-septate, with two additional septa in age; usually surrounded by narrow gel coating that is sometimes elongated over tips.

On leaves or twigs or herbaceous stalks, Europe, North America, India.

Material examined: Europe: Fuckel Fungi Rhen. 952 (isotype of *Sphaeria herpotrichoides*, UPS; slide, IMI); Fungi Rhen. 2171 (isotype of *H. rubi*, UPS). North America: Massachusetts: Barr 6060 on rachis of *Carya* sp. Oregon: Barr 6285, twigs of *Ribes* sp.; 6288, stalks of *Epilobium* (MASS).

Herpotrichia herpotrichoides continues to be infrequently collected, as Cannon (1982) noted. He cited two more collections from Germany, four from Britain, and one from India. My collections, although few in numbers of ascomata, conform with European material.

Herpotrichia juniperi (Duby) Petrak, Ann. Mycol. 23: 43. 1925. Figs. 3, 4
Sphaeria juniperi Duby in Klotzsch Herb. Mycol. no. 1833. 1854.
Laestadia juniperi (Duby) Saccardo, Syll. Fung. 9: 585. 1891.

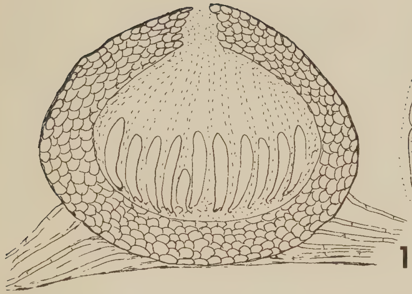
Ozonium plica Kalchbrenner, Math. es Termesz. Közlem. p. 159. 1862.
Sphaeria pinetorum Fuckel, Hedwigia 7: 14. 1868.
Enchnosphaeria pinetorum (Fuckel) Fuckel, Symb. Mycol. p. 147. 1870.
Herpotrichia pinetorum (Fuckel) Winter in Rabenhorst's Krypt. Fl. 2: 208. 1885.
Bertia querceti Rehm, Ascomyceten, no. 43. 1870; in Saccardo, Syll. Fung. 1: 583. 1882.
Enchnosphaeria santonensis Saccardo, Michelia 2: 66.1880.
Lasiosphaeria scabra Auerswald, Fungi Eur. no. 1245; in Saccardo, Syll. Fung. 2: 202. 1883.
Enchnosphaeria passicrinis Saccardo, Syll. Fung. 2: 206. 1883.
Herpotrichia nigra Hartig, Allg. Forst. Jagd. Z. 64: 15. 1888.
Enchnosphaeria nigra (Hartig) Berlese, Icon. Fung. 1: 105. 1892.
Herpotrichia mucilaginosa Starbäck & Greville, Bih. K. Svenska Vetens.-Akad. Handl. 16: 8. 1890.

Ascomata superficial on and immersed in ample subiculum, globose depressed, base ± applanate, 220-400 µm diam, opening by broad pore, tomentum from peridium and subiculum of brown, septate, smooth-walled hyphae, 3-6 µm wide, often iridescent; peridium 30-35 µm wide. Asci (66-)100-145 x (10-)12-18(-20) µm. Ascospores 18-27(-34) x 6-9(-12) µm, hyaline becoming light dull brown, ellipsoid fusoid, 3-(4-) septate.

Anamorph: *Pyrenochaeta*-like; in culture pycnidia appendaged, 80-200 µm diam; conidiogenous cells lining cavity, 4-10 x 1.5-2 µm, branched or unbranched; conidia 1.5-2.5 x 1-2 µm, hyaline, ovoid, one celled (Bose, 1961).

Typically forming "snow mould" of conifers, with leaves and twigs matted together by subiculum; occasionally on other plants. Europe, North America, especially in western mountains.

Figs. 1-10. Species of *Herpotrichia:* 1, 2. *H. herpotrichoides*. 1. Ascoma in section. 2. Ascospores. 3, 4. *H. juniperi*. 3. Habit sketch of ascomata in subiculum. 4. Ascospores. 5-8. *H. macrotricha*. 5. Habit sketches of ascomata. 6. Ascoma in section. 7. Ascus, upper portion, and parts of pseudoparaphyses. 8. Ascospores. 9, 10. *H. symphoricarpi*. 9. Ascoma in surface view. 10. Ascospores. Standard line = 150 µm for figs. 1, 6, 9; 15 µm for figs. 2, 4, 8, 10.



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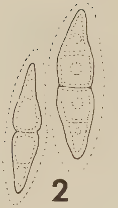

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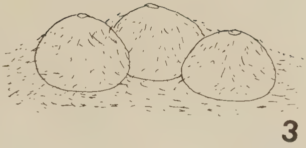

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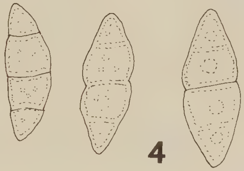

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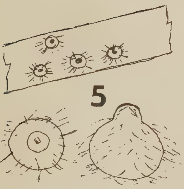

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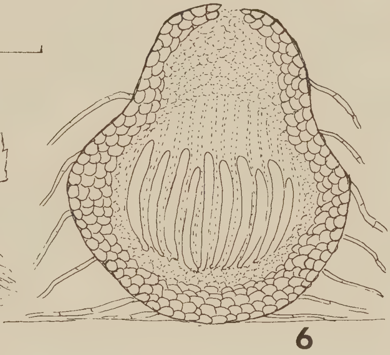

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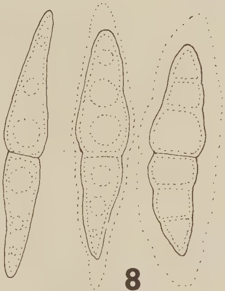

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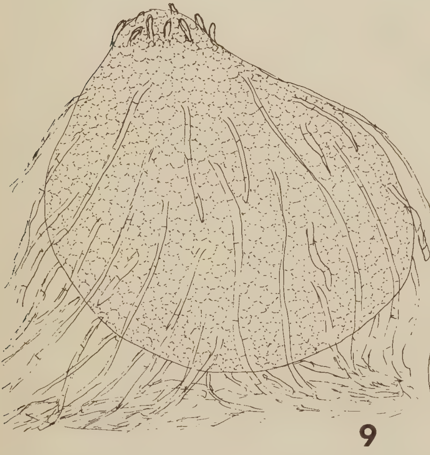

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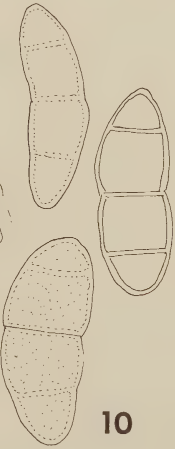

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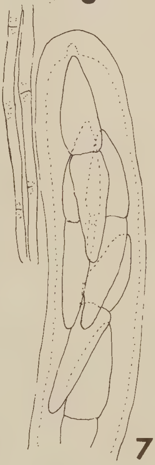

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Material examined: Europe: Rabenhorst-Winter-Patzschke Fungi Eur. no. 3961; Fuckel, Fungi Rhen. 1797 (isotype of *Sphaeria pinetorum*, UPS); Rehm Ascom. no. 996. North America: numerous collections from species of *Abies*, *Juniperus*, *Libocedrus*, *Picea*, *Pseudotsuga*, *Tsuga* (*Pinus* rarely) from Alberta, British Columbia, Montana, Idaho, Washington, Wyoming, Oregon, Colorado, Utah, Arizona, California. Exsiccati specimens include: Bartholomew, Fungi Col. 4634; Ellis N.A.F. 1342 (specimen on *Picea*); Ellis & Everhart Fungi Col. 1737; Solheim Myc. Saximont. Exs. 26, 124.

The synonymy is taken from Bose (1961) and Sivanesan (1972). Sivanesan reported collections of this species from Nova Scotia and Quebec in eastern Canada; my collections under this name from the Gaspé region of Quebec are instead *H. macrotricha*.

Simms (1967) investigated the ecology of *H. juniperi* (as *H. nigra*). The mycelial subiculum developed on branches that were covered by snow. Initials of ascomata formed after the second winter of snow cover, and ascomata matured on the groupd following dehiscence of the infected twigs.

Herpotrichia macrotricha (Berkeley & Broome) Saccardo, Syll. Fung. 2: 213. 1883. Figs. 5-8

Sphaeria macrotricha Berkeley & Broome, Ann. & Mag. Nat. Hist. ser. 2, 9: 319. 1852.

Lasiosphaeria (Enchnosphaeria) macrotricha (Berkeley & Broome) Cooke, Grevillea 16: 16. 1887.

Sphaeria scabra Currey, Trans. Linn. Soc. London 22: 315. 1859.

Lasiosphaeria scabra (Currey) Saccardo, Syll. Fung. 2: 202. 1883.

Lasiosphaeria (Leptospora) scabra (Currey) Massee, Grevillea 16: 37. 1887.

Venturia callimorpha Auerswald, Bot. Tausch-Ver. 1867-68, non *V. callimorpha* (Montagne) Auerswald, non *Sphaeria callimorpha* Montagne.

Enchnoa callimorpha (Auerswald) Winter in Rabenhorst, Fungi Eur. no. 1238. 1869.

Herpotrichia callimorpha (Auerswald) Winter, Hedwigia 23: 99. 1885.

Enchnosphaeria callimorpha(Auerswald) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 132: 95. 1923.

Sphaeria albidostoma Peck, New York State Mus. Rep. 32: 51. 1879.

Herpotrichia leucostoma Peck, Bull. New York State Mus. 2: 23. 1887. (name change only)
Herpotrichia albidostoma (Peck) Saccardo, Syll. Fung. 9: 857. 1891.
Herpotrichia boldae Spegazzini, Fungi Chil. p. 65. 1910.
Didymella agrostidis Dearness & House, Bull. New York State Mus. 233/234: 34. 1921.

Ascomata (150-)200-400 µm diam, 250-450 µm high, globose to pyriform, apex broadly caplike, pallid grayish white under dissecting microscope; tomentum of narrow septate hyphae; peridium brown, 20-37 µm wide, in the caplike apex of hyaline or light yellow pseudoparenchymatous cells, only the outer layer brown, finally opening as broad pore. Asci (70-)90-150 x (10-)12-15(-18) µm, usually 8-spored, at times 4- or 6-spored. Ascospores (21-)24-43 x (4-)5-7.5 µm, hyaline, in age dull brown, fusoid, 1-(3-5-)septate; wall finely verruculose in age, narrow gel coating often elongate over tips as appendages.

On varied substrates, culms of sedges, grasses, stalks of herbaceous plants, woody twigs, nut pericarps, leaves of conifers. Widely distributed in temperate regions.

Material examined: Europe: slides of cotype of *Sphaeria macrotricha*, of holotype of *Sphaeria scabra* (IMI); Rabenhorst Fungi Eur. 1238 as *Enchnoa callimorpha* (IMI). South America: slide of holotype of *Herpotrichia boldae* (IMI). North America: Quebec: Barr 2194, 2202, on *Juniperus* leaves (MASS). Maine: Barr 3313B on *Thuja* leaves; Barr 3451 on *Fraxinus* leaves (MASS). Massachusetts: Barr 4794 on *Carya* pericarps (MASS). New York: holotype of *Sphaeria albidostoma* on twigs of *Acer spicatum*, Catskill Mts., Sep (NYS, part in NY); holotype of *Didymella agrostidis*, Albany, 3 Jun 1918 (NYS); on *Solidago* stalks, Mt. Marcy, Aug, Peck (NYS). Georgia: GA 8234 on culms of *Carex* (GA); Barr 6493 on *Arundinaria* (MASS).

The caplike apex to ascomata is a distinctive feature of this species. Bose (1961, as *H. callimorpha*) reported numerous collections on a variety of substrates from India; the fungus grew in culture but produced no anamorph. Sivanesan (1972) examined numerous collections from Europe and one from Chile. Both authors had included *Sphaeria albidostoma* as a synonym of *H. schiedermayeriana*, based upon description only. The holotype of Peck's species shows well the capitate apex, as well as basal asci and hyaline ascospores with constrictions in each hemispore, structures quite different from those of *Byssosphaeria schiedermayeriana*.

Herpotrichia symphoricarpi (Tracy & Earle) Barr in Holm, Svensk Bot. Tidskr. 62: 239. 1968. Figs. 9, 10
Gibberidea (?) symphoricarpi Tracy & Earle, Plantae Bakerianae 1: 28. 1901.

Ascomata separate or gregarious in small groups, erumpent, globose depressed, 450-550 µm diam, 400-500 µm high, short papillate, tomentose, tomentum as short hyphal appendages toward apex, more elongate and recumbent from middle and lower peridium and forming sparse subiculum; peridium 28-33 µm wide. Asci 100-120 x 16.5-20 µm. Ascospores 24-31(-38) x 6-10 µm, reddish brown, ellipsoid, ends obtuse, 3-septate, end cells lighter than mid cells.

On twigs of *Symphoricarpos*, Colorado.

Material examined: Bob Creek west of Mt. Hesperus, 27 Jun 1898, Plants of S. Colorado 173, 2 packets (holotype, NY).

I share L. Holm's (1968) reservations about the disposition of this species, mainly because of ascospore shape and pigmentation. There are, however, several series of species with varied shapes to the ascospores within the closely related genus *Massarina*. In all other features *H. symphoricarpi* is in reasonable agreement with my concept of *Herpotrichia*.

Neopeckia Saccardo in Peck, Bull. Torrey Bot. Club 10: 127. 1883.
Didymotrichia Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Ascomata globose, medium sized, black, papilla short and broad, opening by rounded pore, superficial on substrate, immersed beneath and in abundant subiculum of narrow, long-celled, dark reddish brown hyphae, these penetrating leaf through stomata; peridium firm, composed of several rows of reddish brown, slightly compressed pseudoparenchymatous cells, thin walled and pallid internally; surface smooth except for hyphae appendages similar to hyphae of subiculum. Asci bitunicate, basal, cylindric, nearly sessile with footlike base usually bent, 8-spored. Pseudoparaphyses narrowly cellular, slightly branched, gelatinizing in mature ascomata. Ascospores reddish brown to dark brown; ellipsoid ovoid, ends obtuse, slightly asymmetric, upper hemispore slightly broader than lower, straight; one-septate, rarely 2- or 3-septate, septum ± median, slightly constricted; wall thick, smooth, at times surrounded by narrow gel coating; contents with one large globule per cell; overlapping uniseriate in the ascus.

Anamorph: coelomycetous, *Pyrenochaeta*-like.

Type species: *N. coulteri* (Peck) Saccardo.

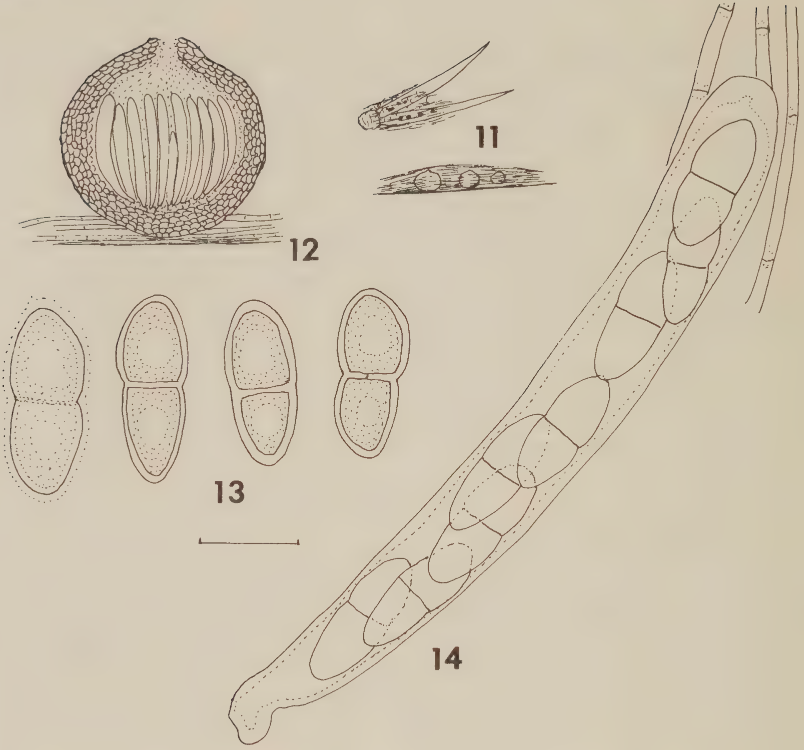
Bose (1961) arranged *N. coulteri* in *Herpotrichia*, and other authors have accepted this decision. *Neopeckia coulteri* differs in several respects from species of *Herpotrichia*, most notably in long cylindric asci that occupy the locule almost completely and in ovoid, brown, one-septate ascospores. *Neopeckia* is reinstated as a genus separate from *Herpotrichia* s. str. In its habit on conifer leaves and twigs, *N. coulteri* resembles *Herpotrichia juniperi*, but the two species differ in centrum structure. Ascospores of *Neopeckia coulteri* are usually one-septate, rarely two- or three-septate (Boyce, 1916), and are always broader and darker brown than those of *Herpotrichia juniperi*.

At present, *Neopeckia coulteri* is the only species of the genus. *Herpotrichia millettiae* Sivanesan (1972) may also belong here, with cylindric asci that fill the centrum at maturity and broadly ovoid, light brown ascospores. The less pigmented ascospores, and the habit on dead branches of *Millettia* sp. (Leguminosae), differ from those characters of *Neopeckia coulteri*.

For comments on *Didymotrichia*, see discussion under *Byssosphaeria*.

Neopeckia coulteri (Peck) Saccardo in Peck, Bull. Torrey Bot. Club 10: 127. 1883. Figs. 11-14
Sphaeria coulteri Peck in Hayden's U.S. Geol. Survey 1872, 6: 792. 1873.
Enchnosphaeria coulteri (Peck) Saccardo, Syll. Fung. 2: 207. 1883.
Lasiosphaeria coulteri (Peck) Ellis & Everhart, North Amer. Pyreno. 147. 1892.
Didymotrichia coulteri (Peck) Berlese, Atti Contr. Bot. Internaz. Genova 1892: 572. 1893.
Herpotrichia coulteri (Peck) Bose, Phytopathol. Z. 41: 195. 1961.
Lasiosphaeria acicola Cooke, Grevillea 8: 87. 1880.
Amphisphaeria acicola (Cooke) Saccardo, Syll. Fung. 1: 727. 1882.

Ascomata 250-380(-500) μm diam, hyphae of appendages and subiculum 2-5 μm wide. Asci 120-160 x 12-22 μm. Ascospores 19.5-27.5 x 9-10.5 μm; gel coating 1.5-2 μm wide.



Figs. 11-14. *Neopeckia coulteri.* 11. Habit sketches of ascomata in subiculum. 12. Ascoma in section. 13. Ascus and parts of pseudoparaphyses. 14. Ascospores. Standard line = 150 µm for fig. 12; 15 µm for figs. 13, 14.

Anamorph: Pycnidia small, conidia borne from short phialides lining centrum, one-celled, hyaline, 2.5-4 x 1.5-2 µm; developed in culture (Bose, 1961).

Smothering and matting together leaves and twigs of species of *Pinus* (*P. albicaulis, P. aristata, P. contorta, P. jeffreyi, P. murrayana, P. monticola, P. ponderosa*). In mountain regions of western North America; also reported from Switzerland (Bose, 1961, on *P. montana*) and Roumania (Sivanesan, 1972, on *P. pumilio*).

Material examined: Numerous collections from western North America, from British Columbia, Washington, Oregon, California, Idaho, Montana, Wyoming, Colorado, Nevada. Exsiccati specimens include: Bartholomew Fungi Col. 4647; Ellis N.A.F. 1342 p.p.; California Fungi 486, 654; Flora of Washington 219; Mycobiota of North America 35; Myc. Saximont. Exs. 125; Plants of Idaho 3644; Plants of Nevada 1350.

The original collection of *Sphaeria coulteri* from Yellowstone Lake was not found among Peck's specimens in NYS, although other authentic material is preserved there. In one of the folders in NY, a note from Peck to Seaver, dated 24 Apr 1911, indicated that the original specimen apparently was lost from the capitol building "when many things destroyed by leaky roofs and many others stolen." In the *Neopeckia coulteri* folder in UPS is a portion of presumptive isotype labelled "Yellowstone (Coulter) P. A. Saccardo" that accords well with other collections of this species.

Lojkania Rehm, Növeny Kozl. 4: 2. 1905.
Sydowina Petrak, Ann. Mycol. 21: 182. 1923.

Ascomata immersed in and under periderm or with bases in outer layers of decorticated wood, gregarious or separate, erumpent, superficial when periderm gone; medium large, pyriform or ovoid, tapering to broad apex, ± beaklike at times, at times flared below tip, pore rounded; surface smooth or roughened, usually surrounded by reddish brown hyphae, sparse or abundant, that forms subiculum toward base; peridium firm, reddish brown, of small ± compressed layers of cells, or double and of small sclerotial cells. Asci basal to lateral or ± peripheral, cylindric or clavate and stipitate. Pseudoparaphyses trabeculate, in matrix. Ascospores clear brown to dark reddish brown; broadly ellipsoid fusoid, often biconic, symmetric; one-septate, slightly or strongly constricted, separating into part cells at times; wall thick, dark, smooth, verrucose, foveolate, or longitudinally striate, occasionally surrounded by narrow gel coating; contents with one large globule per cell; uniseriate or partially biseriate in the ascus.

Anamorph not known for most species.

Saprobic on branches, periderm, or decorticated wood of gymnosperms and angiosperms.

Type species: *L. hungarica* Rehm = *L. melasperma* (Cooke) Barr.

Sydowina vestita, the type species of *Sydowina*, does not differ sufficiently from *Lojkania hungarica*, the type species of *Lojkania*, to permit separation. Both names are predated by *Sphaeria melasperma* as Sivanesan (1972) pointed out.

The worldwide distribution of species of *Lojkania* is little known. The species recognized here are most readily separated by characteristics of the ascospores.

Key to temperate North American species of *Lojkania*

1. Ascospores deeply constricted at the septum, readily separating at maturity into part spores, (19-)23-30(-33) x 9-13 µm .... *L. separans*
1. Ascospores somewhat or not constricted at the septum, not separating into part spores 2
   2. Ascospore wall ornamented by longitudinal striae, 10-16 x 5-7.5 µm; asci clavate and stipitate .... *L. striatospora*
   2. Ascospore wall smooth, verrucose, or foveolate, ascospores larger; asci cylindric 3
3. Ascospores (20-)22-30(-35) x 9-12(-14) µm, wall smooth, ends acute .... *L. melasperma*
3. Ascospores 18-25 µm long, wall smooth or ornamented ...4
   4. Ascospore wall verrucose or verruculose .... *L. decorticata*
   4. Ascospore wall smooth or foveolate 5
5. Ascospores 7.5-10(-11) µm wide; ascomata short papillate *L. utahensis*
5. Ascospores 9-12 µm wide; ascomata pyriform with conspicuous papilla .... *L. nuda*

Lojkania decorticata (Cooke & Harkness) Barr, comb. nov. Figs. 24, 25

Sphaeria decorticata Cooke & Harkness, Grevillea 13: 19. 1884.

Amphisphaeria decorticata (Cooke & Harkness) Berlese & Voglino, Addit. Syll. Fung. 124. 1886.

Ascomata 385-550 µm diam, pyriform or ± ovoid, superficial from cracks in decorticated periderm or wood beneath epidermis, separate or few gregarious; peridium ca. 40 µm wide. Asci 120-160 x 15-17 µm. Ascospores 18-25 x (7-)9-10(-11) µm, clear brown becoming dark reddish brown, not or slightly constricted at septum, at times with dark banding in each hemispore but not a true septum; wall verruculose or verrucose, surrounded by gel coating.

On wood of *Quercus agrifolia*, old leaf tips of *Yucca* sp. California.

Material examined: California: San Francisco, Harkness (holotype, NY); San Francisco State Univ. Campus, Dec 1980, H. E. Bigelow (MASS).

The obviously roughened wall of ascospores is a distinctive feature of this species. Cultures from ascospores of the specimen on *Yucca* formed dark mycelium. Pycnidia were produced within two weeks, globose, short papillate, 220-275 μm diam. Conidiogenous cells lined the inner wall, short, hyaline, annellidic. Conidia were formed and held together in a gel material, dark brown, 10-13 x 4.5-5.5 μm, one celled or one septate, surface finely verruculose. This is the first anamorphic connection reported in members of the genus, and more information is needed.

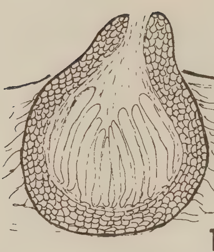
Lojkania melasperma (Cooke) Barr, comb. nov.   Figs. 15-17
Psilosphaeria melasperma Cooke, Grevillea 8: 118. 1880.
Amphisphaeria melasperma (Cooke) Saccardo, Syll. Fung. 1: 725. 1882.
Herpotrichia melasperma (Cooke) Sivanesan, Mycol. Pap. 127: 8. 1972.
Delitschia lignicola Mouton, Bull. Soc. Roy. Bot. Gelb. 25: 151. 1886.
Sydowina lignicola (Mouton) Petrak, Ann. Mycol. 23: 96. 1925.
Herpotrichia lignicola (Mouton) Bose, Phytopathol. Z. 41: 201. 1961.
Neopeckia quercina Delacroix, Bull. Soc. Mycol. France 6: 182. 1890.
Rhynchostoma julii Fabre var. *vestitum* Rehm, Hedwigia 30: 256. 1891.
Sydowina vestita (Rehm) Petrak, Ann. Mycol. 21: 182.1923.
Lojkania hungarica Rehm, Növeny Kozl. 4: 2. 1905.

Ascomata 400-700 μm diam, pyriform, erumpent superficial. Asci 130-250 x 12-16 μm. Ascospores 20-39 x 9-14 μm, ends ± acute, constricted at median septum.

On coniferous and angiospermous wood. Europe, North America.

Material examined: Europe: Rehm Ascom. 1030 (slide ex holotype of *Rhynchostoma julii* f. *vestitum*, IMI); Petrak, Fl. Boh. et Mor. exs. 1700 (slide ex *Rhynchostoma julii* var. *vestitum*, IMI); Petrak, Myc. Carpatica 271 (slide ex *Sydowina vestita*, IMI); *Lojkania hungarica* (isotype, UPS; slide ex holotype, IMI); *Neopeckia quercina* (slide ex holotype, IMI). North America: New York: W. R. Gerard 237a (slide ex holotype *Psilosphaeria melasperma*, IMI).

Sivanesan (1972) studied and provided synonymy for this species. I was privileged to examine his slides in IMI, which show variations in shape of ascomata and length of beaks among the collections, but great similarity in ascospore shape. This species has the largest ascospores of those included in *Lojkania*.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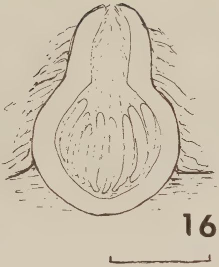
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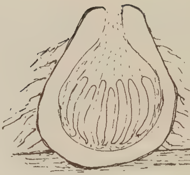
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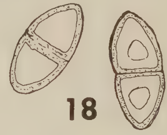
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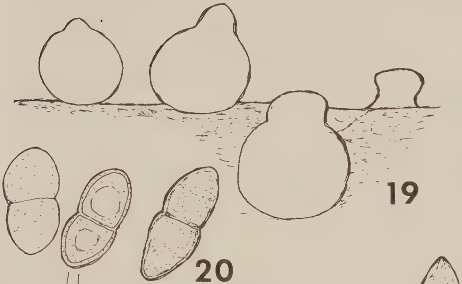
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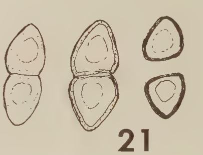
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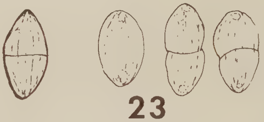
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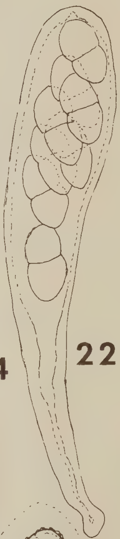
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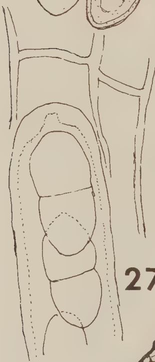
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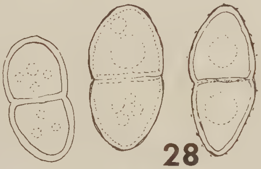
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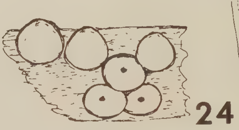
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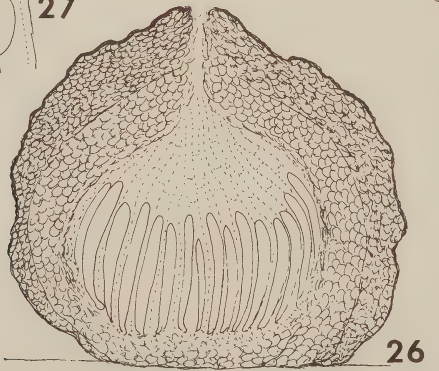
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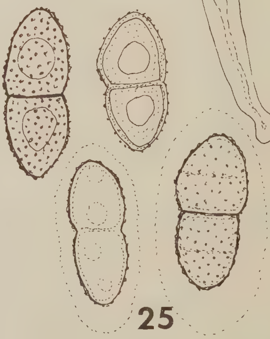
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Lojkania nuda (Ellis & Everhart) Barr, comb. nov. Figs. 19, 20
Amphisphaeria nuda Ellis & Everhart, Erythea 2: 18. 1894.
Herpotrichia australis Bose, Phytopathol. Z. 41: 200. 1961.

Ascomata 250-600 μm diam, pyriform, apex at times flared below tip. Asci 115-165 x 12-16 μm, basal. Ascospores 18-24 x 9-12 μm, biconic, not or slightly constricted at septum; wall smooth or foveolate.

On periderm or wood of angiosperms. North America, South Africa.

Material examined: South Africa: Pretoriuskop Rest Camp, Krüger Nat'l Park, Transvaal, 16 Mar 1960, H. Schüepp (slides and specimen ex holotype of *H. australis*, IMI). North America: Kansas: Ellis & Everhart N.A.F. 3001, on *Celtis*, Rockport, Nov 1893 (isotype, MASS; holotype of *A. nuda*, NY).

The North American specimens do not seem to differ in any way from the type of *Herpotrichia australis*, although both host and locality are quite different.

Lojkania separans (Ellis & Everhart) Barr, comb. nov.
Fig. 21
Amphisphaeria separans Ellis & Everhart, Bull. Torrey Bot. Club 24: 130. 1897.
Herpotrichia separans (Ellis & Everhart) Sivanesan, Mycol. Pap. 127: 10. 1972.
Sydowina moravica Petrak, Ann. Mycol. 23: 95. 1925.
Herpotrichia petrakiana Bose, Phytopathol. Z. 41: 199. 1961.

Figs. 15-28. Species of *Lojkania*: 15-18. *L. melasperma*. 15-17. Variations in shape and position of ascomata in section; 15 from type of *Psilosphaeria melasperma*, 16 from type of *Neopeckia quercina*, 17 from type of *Lojkania hungarica*. 18. Ascospores. 19, 20. *L. nuda*. 19. Habit sketch of ascomata in and erumpent from substrate. 20. Ascospores. 21. *L. separans*, ascospores. 22, 23. *L. striatispora*. 22. Ascus. 23. Ascospores, that on left from slide of type. 24, 25. *L. decorticata*. 24. Habit sketch of ascomata on substrate. 25. Ascospores. 26-28. *L. utahensis*. 26. Ascoma in section. 27. Upper portion of ascus and fragment of pseudoparaphyses. 28. Ascospores. Standard line = 300 μm for figs. 15-17; 150 μm for fig. 26; 15 μm for figs. 18, 20-23, 25, 27, 28.

Ascomata 500-900 µm diam, pyriform, ovoid or subglobose, erumpent. Asci 130-200 x 12-16 µm. Ascospores (19-)23-30 (-33) x 9-13 µm, ends acute, constricted deeply at the median septum and often separating into part spores at maturity.

On branches of angiosperms, North America, Pakistan, India.

Material examined: North America: Kansas: slide ex holotype of *A. separans*, IMI. Pakistan: slide ex holotype of *H. petrakiana*, IMI. India: Bikaner, G. P. Sharma, IMI.

I am indebted to Sivanesan (1972) and to his slides in IMI for information on this species.

Lojkania striatispora (Papendorf & von Arx) Barr, comb. nov. Figs. 22, 23

Herpotrichia striatispora Papendorf & von Arx, Nova Hedwigia 12: 395. 1966.

Ascomata 330-600 µm diam, pyriform, immersed erumpent. Asci 62-90 x 9-12 µm, clavate, stipitate. Ascospores 10-16 x 5-7.5 µm, ends acute, constricted or not constricted at the median septum, wall roughened by longitudinal raised striae.

On branches of angiosperms: South Africa, North America.

Material examined: South Africa: slide ex holotype of *H. striatispora*, CBS 385.65, IMI. North America: Iowa: Barr 6933 (MASS). Arizona: Barr 6773 (MASS).

The collection from Arizona on *Cercidium* agrees in all respects with the description and illustration of ascospores, as well as with the slide from type culture deposited in IMI, except that the ascospores of the Arizona material are often constricted at the septum, whereas those from South African material are not. The Iowa collection on *Carya* is sparse in numbers of ascomata, but is in accord with the other material seen. Small, longitudinally striate ascospores are definitive.

Lojkania utahensis (Petrak) Barr, comb. nov. Figs. 26-28

Melanopsammina utahensis Petrak, Ann. Mycol. 25: 274. 1927.

Ascomata 440-770 µm diam, globose, short papillate, superficial and bases embedded in decorticated wood; peridium broad, especially above, up to 65 µm wide at base and to 78-104 µm wide above, of small sclerotial cells. Asci 100-160 x 10-15 µm. Ascospores 16-24 x 7.5-10(-11) µm, hyaline to light brown, finally dark brown, septum thick; wall smooth or at times verruculose.

On woody branches, western North America.

Material examined: North America: Montana: Great Falls, 18 Jul 1889, F. W. Anderson (on type material of *Teichospora mammoides*, NY); Utah: Grantsville, 13 Apr 1918, J. F. Brenckle, Utah Fungi n. 31 (isotype, NY); California: Mt. Shasta, near Horse Camp, Siskiyou Co., 23 Jul 1941, W. B. Cooke 15597 (NY).

Melanopsammina, typified by *M. carinthiaca* v. Höhnel, is evidently hyalodidymous and a pleosporaceous fungus. The type specimen in FH no longer bears any fungus, nor did it when L. Holm examined it in 1966. Holm (1968) thought the species hardly differed from *Lentomita caespitosa* Niessl. This and related species Müller and von Arx (1962) had relegated to *Otthia*.

Lojkania utahensis seems to be closely related to *L. nuda* but has a less developed apical papilla and somewhat narrower ascospores. Both species may appear to be superficial when the covering periderm has been sloughed.

Pseudotrichia Kirschstein, Ann. Mycol. 37: 125. 1939.

Ascomata immersed erumpent to superficial, gregarious or scattered; globose, pyriform, or ovoid, with short to somewhat elongated papillate apex, usually flask-shaped in section; apex and pore rounded or apex compressed and pore slit-like; surface black, covered by greenish, yellowish, rusty orange, grayish or brown verruculose hyphae, often including granular pigmented material, apical region glabrous; peridium firm, composed of compressed cells, reddish brown, pigment patchy; ostiolar canal periphysate. Subiculum present or sparse. Asci bitunicate, peripheral, clavate. Pseudoparaphyses trabeculate, in matrix. Ascospores hyaline becoming light brown in age; fusoid, tapered to obtuse or ± acute ends, symmetric, straight or inequilateral or slightly curved; one or several septate, primary septum median, constricted, each hemispore septate in age; contents with one or a few globules; wall smooth or finely verruculose in age, usually surrounded by gel coating; biseriate, partially uniseriate, or parallel in the ascus.

Anamorph not known.

On or in old stromata of other ascomycetes or on decaying wood, hypersaprobic.

Type species: *P. stromatophila* Kirschstein = *P. mutabilis*

Petrak erected the genus *Khekia* in the Lophiostomataceae, but his exsiccati specimen (Flor. Boh. et Mor. Nr. 132) was determined as *Calospära ambigua* Pass., and he proposed the combination *Khekia ambigua* (Pass.) Petrak (Hedwigia 62: 284. 1921). Although Petrak's fungus was *Pseudotrichia mutabilis*, Passerini's species was not, and *Calospora ambigua* Passerini is a synonym of *Pseudovalsa longipes* (Tul.) Saccardo in the Diaporthales (Wehmeyer, 1941b). Kirschstein erected *Pseudotrichia stromatophila* based upon Petrak's Nr. 132 (as 123) "*Calospora ambigua* Pass. Forsan nova species?" and observed that *Khekia* was an invalid name. Petrak (1940) repudiated Kirschstein's name and retained *Khekia*. At this time he utilized the earlier epithet and called the species *Khekia mutabilis*. Petrak also considered *Lophiotricha viburni* Richon (Bull. Soc. Mycol. France 32: XI. 1885) as possibly providing an earlier generic name, but concluded that the two taxa differed. Wehmeyer (1941a) accepted *Pseudotrichia*, and at that time used the epithet *aurata*. He reported on some aspects of development in culture. Colonies on oat agar were yellowish green on the surface. Primordia developed on sterilized twigs of *Ulmus*, on both healthy twigs and ones bearing stromata of *Eutypella* sp. Young ascomata contained at first interwoven hyphae. Meristematic cells in the upper regions formed a conic papilla, and others produced down-growing pseudoparaphyses. Asci were not produced in his cultures. Munk (1956) also accepted the genus, but evidently in a different sense according to his description and the position in classification. His *Pseudotrichia minor* seems to be a species of *Massarina*.

Pseudotrichia differs from *Herpotrichia* in several respects. Luttrell (1973) noted under *Herpotrichia* that *Pseudotrichia* lacked a subiculum. The major differences are the rather large ascomata, often with compressed apices, and the peripheral arrangement of asci and trabeculate pseudoparaphyses in *Pseudotrichia*. Petrak was quite correct about the compressed, lophiostomataceous aspect of the fungus, although within a single collection the apices may be rounded or compressed or somewhat triangular. An authentic specimen in Herb. E. Fries (UPS; Smolandia: Femsjö) shows such variation in the apices of ascomata.

Pseudotrichia mutabilis (Persoon: Fries) Wehmeyer, The Fungi of New Brunswick, Nova Scotia, and Prince Edward Island, p. 35 (footnote). 1950. Figs. 29-32

Sphaeria (Villosae) mutabilis Persoon: Fries, Syst. Mycol. 2: 447. 1823.

Lasiosphaeria mutabilis (Persoon: Fries) Fuckel, Jahresber. Nassau. Ver. Naturk. 25-26: 302. 1871.

Herpotrichia mutabilis (Persoon: Fries) Winter in Rabenhorst's Kryptogamenfl. 1(2): 209. 1885.

Enchnosphaeria mutabilis (Persoon: Fries) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 126: 346. 1917.

Khekia mutabilis (Persoon: Fries) Petrak, Ann. Mycol. 38: 203. 1940.

Nectria aurigera Berkeley & Ravenel var. *flavitecta* Berkeley & Curtis, Grevillea 4: 46. 1875.

Calonectria flavitecta (Berkeley & Curtis) Saccardo, Michelia 1: 308. 1878.

Sphaeria viridicoma Cooke & Peck, New York State Mus. Rep. 29: 64. 1876 (name only, Rep. 26: 87. 1874).

Lasiosphaeria viridicoma (Cooke & Peck) Saccardo, Syll. Fung. 2: 193. 1883.

Lophiotricha viridicoma (Cooke & Peck) Kauffman, Pap. Michigan Acad. 9: 189. 1929.

Pseudotrichia viridicoma (Cooke & Peck) Wehmeyer, Canad. J. Res. C, 20: 579. 1942.

Lophiotrema parasitica Peck, New York State Mus. Rep. 40: 71. 1887.

Lophiostoma angustilabrum (Berkeley & Broome) Cooke var. *parasiticum* (Peck) Chesters & Bell, Mycol. Pap. 120: 9. 1970.

Lophiotrema vestita Peck, New York State Mus. Rep. 40: 71. 1887.

Calonectria chlorinella (Cooke) Ellis & Everhart, North Amer. Pyreno. p. 113. 1892, non Cooke.

Calonectria atkinsonii Rehm, Ann. Mycol. 2: 178. 1904.

Zignoella (Trematosphaeria) ybbsitziensis Strasser, Ann. Mycol. 9: 82. 1911.

Melogramma ybbsitziensis (Strasser) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 123: 103. 1914.

Thyridaria aurata Rehm, Ann. Mycol. 10: 392. 1912, non Rehm, Ann. Mycol. 12: 172. 1914.

Pseudotrichia aurata (Rehm) Wehmeyer, Mycologia 33: 60. 1941.

Khekia ambigua Petrak, Hedwigia 62: 284. 1921 sub *Khekia ambigua* (Passerini) Petrak.

Pseudotrichia stromatophila Kirschstein, Ann. Mycol. 37: 125. 1939.

Ascomata 385-615 µm diam, 440-770 µm high; peridium broad, 32-60 µm wide. Asci (90-)120-155 x 12-20 µm. Ascospores 26-39 x (6-)7-9 µm, 1-3-septate.

Hypersaprobic in old stromatic ascomycetes or on wood bearing hyphae of other fungi. Temperate Europe and North America.

Material Examined: Numerous collections from eastern North America and from Colorado and Arizona. Type specimens: New York: Sandlake, Oct, C. H. Peck (isotype of *Sphaeria viridicoma*, NYS); Elizabethtown, Sep, C. H. Peck (holotype of *Lophiotrema parasitica*, NYS); Gansevoort, Sep, C. H. Peck (holotype of *Lophiotrema vestita*, NYS).

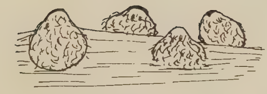
Pseudotrichia in temperate regions is represented by *P. mutabilis*, a species that shows variation in rounded or compressed papillate apices and in pigmentation of the tomentum clothing ascomata. Two species known from Venezuela add to the genus more conspicuous apices that are broad and short beaklike, and tomentum that forms a basal subiculum on the substrate. Although the ascospores differ, the following two species are obviously closely related. Both present a spectacular appearance under the dissecting microscope, the broad apical papilla contrasting strongly to the tomentose body of the ascoma, and seated in a weft of gray or brown subiculum. The ascospores of *P. mamillata* are much like those of *P. mutabilis*, whereas those of *P. pachnostoma* are considerably longer and have more septa.

Pseudotrichia mamillata Barr, sp. nov. Figs. 33-35

Ascomata globosa 440-495 µm diametro, gregaria prope basin subiculo brunneo extenso tomentoso ochraceo luteo; apices glabri nigri mamillati. Asci bitunicati cylindrici 100-110 x 10-12 µm. Pseudoparaphyses trabeculatae. Ascosporae 33-40 x 5-6 µm, brunneolae fusoideae quinqueseptatae.

Holotypus in monocotyledoni ignoti "La Silla, south-

Figs. 29-37. Species of *Pseudotrichia:* 29-32. *P. mutabilis*. 29. Habit sketch of ascomata. 30. Ascoma in section. 31. Ascus and portions of pseudoparaphyses. 32. Ascospores. 33-35. *P. mamillata*. 33. Habit sketch of ascomata. 34. Portions of rough-walled hyphae. 35. Ascospores. 36-37. *P. pachnostoma*. 36. Habit sketch of ascomata. 37. Ascospores. Standard line = 150 µm for fig. 30; 15 µm for figs. 31, 32, 34, 35, 37.



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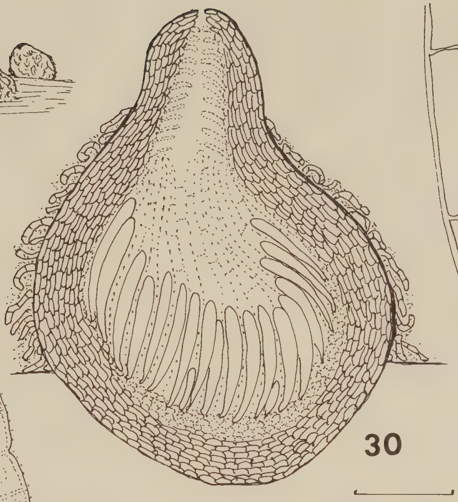

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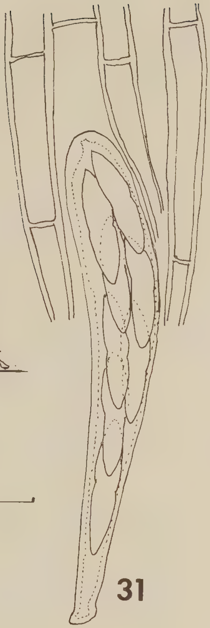

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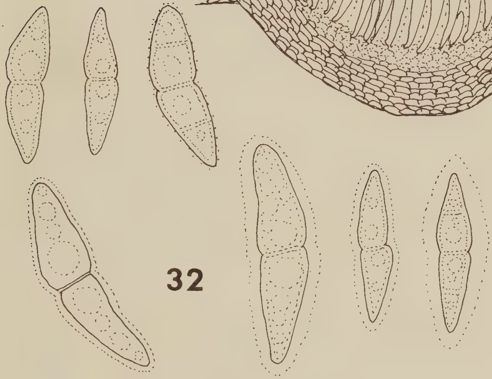

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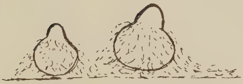

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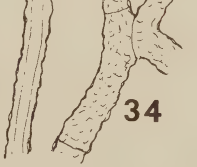

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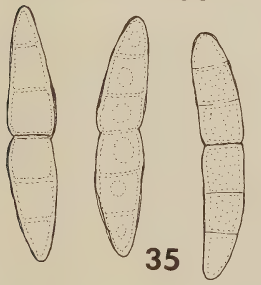

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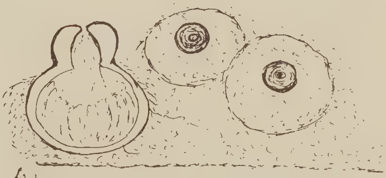

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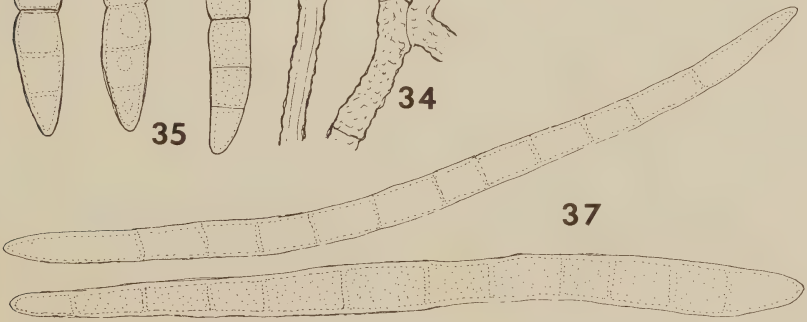

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facing slope, Parq. Nac. En Avila, Edo. Miranda, Venezuela, 30 Jun 1972," leg. K. P. Dumont et al., n. VE-3829 (holotype, NY; isotype, MASS; portion in VEN not examined).

Ascomata 440-495 µm diam, gregarious with bases immersed in brown subiculum, tomentum ochraceous yellow; apex glabrous, black, conspicuous above tomentose body of ascoma. Asci 100-110 x 10-12 µm. Ascospores 33-40 x 5-6 µm, clear light brown, ends paler, fusoid, 5-septate, with slight constriction at median septum.

On unidentified bamboo, known only from type collection.

Pseudotrichia pachnostoma (Berkeley & Curtis in Cooke) Barr, comb. nov. Figs. 36, 37

Byssosphaeria (Trichosphaeria) pachnostoma Berkeley & Curtis in Cooke, Grevillea 15: 80. 1886.

Trichosphaeria pachnostoma (Berkeley & Curtis in Cooke) Saccardo, Syll. Fung. 9: 602. 1891.

Ascomata up to 880 µm diam, gregarious with bases immersed in brown subiculum, tomentum gray or light brown; apex glabrous, black or dark gray, ca. 385 µm diam, 330 µm high; peridium 50-90 µm wide. Asci 130-160 x 18-20 µm. Ascospores 100-120 x 5-7 µm, elongate fusoid, tapered to ± obtuse ends, brown, end cells hyaline or nearly so, 7-11-septate, not constricted at septa.

On wood, base of palm frond, Venezuela.

Material examined: "*Sphaeria pachnostoma* B. & C." (NY, authentic specimen); Uei-Tepui, north-facing slope, road between El Dorado and Sta. Elena, Edo. Bolivar, Venezuela, 5 Aug 1972, K. P. Dumont et al., VE-6953 (NY, MASS). The portion of n. VE-6953 deposited in VEN was not examined.

Apparently the name *Sphaeria pachnostoma* was not published by Berkeley, and the first valid presentation of the epithet was by Cooke (1886) where he cited "*Sphaeria pachnostoma* B. & C." and Herb. Berk. no. 9620. Cooke's brief diagnosis disguised the true nature of the fungus; the ascospores were said to be lanceolate, continuous, hyaline, and to measure 30 x 5 µm. Dennis (1970) in his account of fungi of Venezuela mentioned but had not seen the species.

Byssosphaeria M. C. Cooke, Grevillea 7: 84. 1879.

Macbridella Seaver, Mycologia 1: 195. 1909.

Xenonectria v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 129: 149. 1920.

Ascomata superficial, separate or usually gregarious, occasionally coalescent; turbinate, globose, or ovoid, small to large; apex rounded or plane with minute papilla, soon dehiscent and opening by rounded pore, pore and surrounding cells pallid, whitish, or gray or bright yellow, orange or red pigmented (conspicuous when moistened), pore region appearing sulcate or plicate at times; surface often irregular or slightly roughened with protruding cells or pulverulent, usually bearing dependent hyphal appendages that merge as a subiculum beneath gregarious ascomata, appendages lacking at times; peridium composed of thick-walled small pseudoparenchymatous cells, heavily pigmented externally, bright red or reddish brown, inner layers of cells compressed, hyaline or pallid, cells in pore region hyaline or brightly colored, yellow, orange or reddish, in KOH often leaching bright reddish pigments. Asci bitunicate, peripheral, clavate or broadly cylindric. Pseudoparaphyses trabeculate, in matrix. Ascospores hyaline becoming light reddish brown or clear brown, pigment often more intense at tips of spore; ellipsoid or fusoid, ± symmetric, ends acute or obtuse; one-septate, median, usually constricted at the septum, each hemispore remaining one celled or becoming septate although not constricted; contents globular; walls smooth or delicately longitudinally striate, ends with evanescent hyaline appendages at times but not always visible in aged specimens; overlapping biseriate in the ascus.

Anamorph: coelomycetous where known, *Pyrenochaeta*-like.

Saprobic on decorticated wood, bark of fallen branches, old leathery leaves, petioles, pericarps, etc. of angiosperms. Cosmopolitan.

Type species: *B. keitii* (Berkeley & Broome) Cooke = *B. schiedermayeriana*.

Byssosphaeria was designated by Cooke for species in *Sphaeria, Byssisedae* Fries, and has been regarded as including a diversity of Ascomycetes. The genus was validly typified by *B. keitii* (Holm in Farr et al., 1979). *Byssosphaeria keitii*, described from a greenhouse, is identical with *B. schiedermayeriana* (Sivanesan, 1972), and the genus is accepted for taxa with the features described above.

Berlese created *Didymotrichia* (Atti Congr. Bot. Internaz. Genova 1892: 572. 1893) to encompass species that are included in *Byssosphaeria* in the present study. Unfortunately, he did not designate the type species, and he did include *Neopeckia coulteri* (Peck) Saccardo in his list of four species. *Neopeckia coulteri* is the type species of *Neopeckia* Saccardo (1883); *Didymotrichia* is automatically typified by

D. coulteri (Art. 7. 11) and *Didymotrichia* is a synonym of *Neopeckia* (Holm in Farr et al., 1979; personal comm.). Although this was not the intent of Berlese, according to his comments in Icones Fungorum 1: 106, 107 (1890), it is a fact.

Xenonectria v. Höhnel was erected as a genus in the Nectriaceae for *Herpotrichia schiedermayeriana* var. *caldariorum* P. Hennings. Bose (1961) included the generic name as a synonym of *Herpotrichia*, and the species as a synonym of *H. schiedermayeriana*, without further comment. The taxon seems to be inseparable from *Byssosphaeria schiedermayeriana* and furnishes another example of a predominantly tropical species found in greenhouse conditions in temperate regions.

Samuels (1973) established that *Macbridella chaetostroma* (Ellis & MacBride) Seaver, the type species of *Macbridella*, was identical with *Herpotrichia rhodosticta*. This species is *Byssosphaeria rhodomphala* in my interpretation, and *Macbridella* is a synonym of *Byssosphaeria*.

Key to North American Species of *Byssosphaeria*

1. Ascomata with bright orange or reddish pore area 2

1. Ascomata with pallid, gray, or whitish pore area; ascotapering to ± acute ends 4

  2. Ascospores (16-)18-23(-25) x (4-)6-7(-9) µm, ends obtuse, 1-septate .... *B. rhodomphala*

  2. Ascospores longer, ends ± acute 3

3. Ascospores (17-)22-28 x 4-6 µm, 1-3-septate .... *B. xestothele*

3. Ascospores (25-)30-42 x 5-8 µm, 1-3-(5-7-)septate ...... *B. schiedermayeriana*

  4. Ascospores 12-18(-22) x (3-)4.5-5.5 µm, 1-septate ... *B. diffusa*

  4. Ascospores longer and relatively narrower 5

5. Ascospores 18-30 x 3-5 µm 6

5. Ascospores 25-50 x (5-)6-9 µm 8

  6. Ascospores 18-24(-30) x 4-5 µm, 1-3-septate; lower sides of ascomata bearing appendages and seated on subiculum .... *B. alnea*

  6. Ascospores 20-30 x (2.5-)3-5.5 µm, 1-3-septate; surface of ascomata roughened with protruding cells but without appendages, seated on blackened substrate . 7

7. Ascomata globose to ellipsoid, 400-600 µm diam; ascospores 20-30 x 3.5-5.5 µm .... *B. semen*

7. Ascomata ± ovoid, 1-1.5 mm diam; ascospores 25-30 x (2.5-)3-3.5 µm .... *B. oviformis*

8. Ascospores 25-35 x (5-)6-8 µm, 1-3-septate; surface of ascomata with appendages .... *B. jamaicana*
8. Ascospores (30-)40-50 x (6-)7-9 µm, 1-(3-5-)septate; surface of ascomata roughened with protruding cells but without appendages .... *B. salebrosa*

An extralimital taxon is *Herpotrichia erythrinae* Huguenin from New Caledonia. This species is much like *B. xestothele* in length of ascospores but their width and obtuse ends are more those of *B. rhodomphala*. *Byssosphaeria erythrinae* (Huguenin) Barr, comb. nov. (basionym: *Herpotrichia erythrinae* Huguenin, Bull. Soc. Mycol. France 81: 701. 1965) is a recognizable taxon. *Herpotrichia caesalpiniae* (Doidge) Sivanesan from South Africa has ascomata shaped like those of *Byssosphaeria* (cf. Sivanesan, 1972, Pl. 1F) but all other characters are pleosporaceous rather than melanommataceous.

The confusion of taxa in *Byssosphaeria* has been noted several times. It was not resolved by Seaver's (1922) "clarification" of "*Neopeckia diffusa* and *Herpotrichia albidostoma*." I was able to study the collections that Seaver had examined and from his composite descriptions of two species to recognize instead five in *Byssosphaeria* and one in *Herpotrichia*, the isotype of *H. albidostoma* which is *H. macrotricha*. The two smaller-spored species of *Byssosphaeria*, *B. rhodostoma* and *B. diffusa*, were delimited clearly by Bose (1961). The larger-spored species, *B. schiedermayeriana*, *B. jamaicana*, and *B. salebrosa* (with the synonymous name *H. incisa*) differ in surface vestiture and in pigmentation of the apex of ascomata as well as in ascospore sizes.

Byssosphaeria alnea (Peck) Barr, comb. nov. Figs. 46, 47
Cucurbitaria alnea Peck, New York State Mus. Rep. 28: 75. 1876.
Otthia alnea (Peck) Saccardo, Syll. Fung. 1: 740. 1882.
Gibberidea alnea (Peck) Wehmeyer, Canad. J. Res. C, 20: 586. 1942.
Massarina alnea (Peck) L. Holm, Svensk Bot. Tidskr. 62: 226. 1968.

Ascomata 220-460 µm diam, globose, forming compact groups of twenty or more in cracks of periderm; apex with short, shining black papilla; surface bearing brown hyphal appendages that form a subiculum below the group; peridium 40-50 µm wide, pore region pallid. Asci 105-140 x 7.5-12 µm. Ascospores 19.5-24 x 4-5 µm, becoming light brown, fusoid, tapered to acute ends, 1-septate, finally 3-septate;

delicate gelatinous coating or appendages present.

On branches of *Alnus*, northeastern North America.

Material examined: New York: Karner (= Center), May 1874, C. H. Peck (holotype, NYS).

Wehmeyer (1942) reported this species from Nova Scotia. Holm (1968) removed the taxon from *Gibberidea*, and transferred it to *Massarina* as the best accommodation. He tentatively included in synonymy *Massaria alni* Otth ex Jaczewski, *Massarina alni* (Jaczewski) Saccardo, although the type material was immature. *Massarina* in my concept is a genus of the Pleosporales and deviates in several features from *B. alnea.*

Byssosphaeria diffusa (Schweinitz) Cooke, Grevillea 15: 81. 1887. Fig. 45

Sphaeria diffusa Schweinitz, Trans. Amer. Philos. Soc. 4: 210. 1834.

Herpotrichia diffusa (Schweinitz) Ellis & Everhart, North Amer. Pyreno. p. 158. 1892; Starbäck, K. Svenska Vet.-Akad. Handl. 19, III: tab. 2, fig. 17. 1894.

Neopeckia diffusa (Schweinitz) Saccardo, Syll. Fung. 11: 317. 1895.

Didymotrichia diffusa (Schweinitz) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Sphaeria parietalis Berkeley & Curtis, Grevillea 4: 107. 1876.

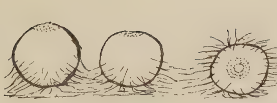
Enchnosphaeria parietalis (Berkeley & Curtis) Saccardo, Syll. Fung. 2: 207. 1883.

Herpotrichia parietalis (Berkeley & Curtis) Ellis & Everhart, North Amer. Pyreno. p. 157. 1892.

Didymotrichia parietalis (Berkeley & Curtis) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 573. 1893.

Neopeckia parietalis (Berkeley & Curtis) Saccardo. Syll. Fung. 11: 317. 1895.

Figs. 38-54. Species of *Byssosphaeria*: 38-41. *B. schiedermayeriana*. 38. Habit sketch of ascomata. 39. Ascoma in section. 40. Upper portion of ascus and portions of pseudoparaphyses. 41. Ascospores. 42. *B. rhodomphala*, ascospores. 43, 44. *B. xestothele*. 43. Habit sketch of ascomata. 44. Ascospores. 45. *B. diffusa*, ascospores. 46, 47. *B. alnea*. 46. Habit sketch of ascomata. 47. Ascospores. 48. *B. jamaicana*, ascospores. 49, 50. *B. oviformis*. 49. Ascoma in section. 50. Ascospores. 51, 52. *B. salebrosa*. 51. Habit sketch of ascomata. 52. Ascospores. 53, 54. *B. semen*. 53. Habit sketch of ascomata. 54. Ascospores. Standard line = 150 μm for fig. 39; 500 μm for fig. 49; 15 μm for figs. 40-42, 44, 45, 47, 48, 50, 52, 54.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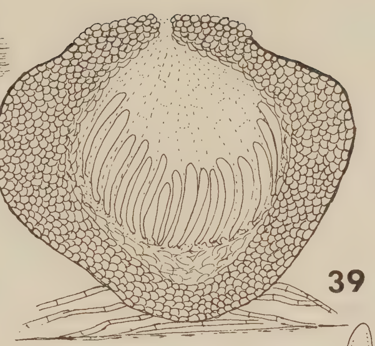
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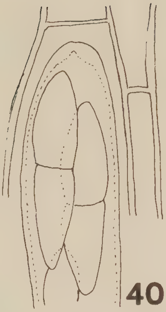
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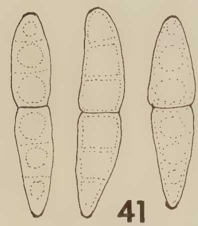
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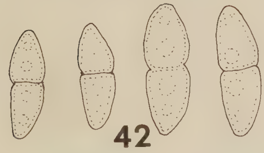
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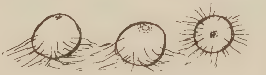
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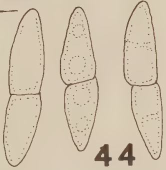
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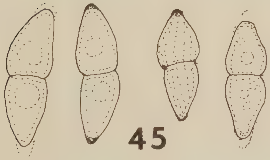
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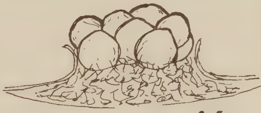
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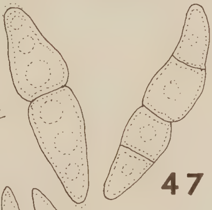
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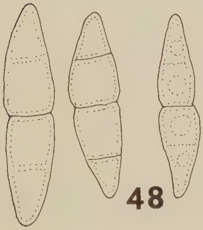
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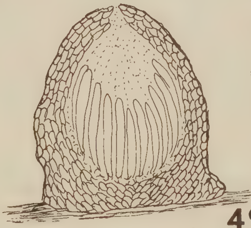
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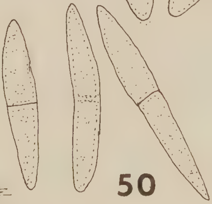
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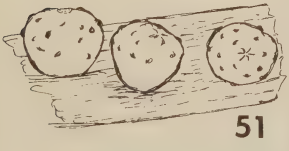
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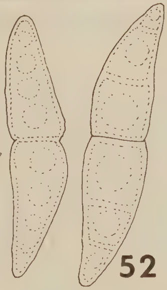
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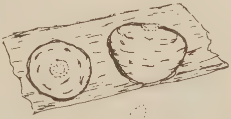
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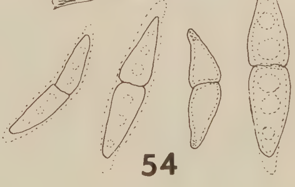
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Ascomata superficial, scattered or gregarious, often in dense crowds on subiculum; ovoid or ± globose, ± turbinate in section, (170-)400-600 µm diam; apex rounded or nearly truncate, with minute papilla at first, opening by small pore; surface dull black below, grayish white at apex around pore; appendages at lower sides merging with subiculum, of narrow reddish brown hyphae; peridium thick, 20-44 µm wide above, 65-150 µm at base, cells small, reddish brown, thick walled, cells around pore pallid or light yellowish, pigment not leaching out in KOH. Asci (50-)70-100 x (9-)12-13 µm, occasionally only 2-4-spored. Ascospores 12-18(-22) x (3-) 4.5-5.5 µm, light clear brown, tips darkened, 1-septate; wall finely longitudinally striate, often with delicate appendages over ends.

Anamorph: *Pyrenochaeta*-like; pycnidia formed in culture, 250-400 µm diam, with hyphal appendages; conidiogenous cells branched or simple, 5-12 x 1.5-2.5 µm; conidia 2-3 x 1-1.5 µm, hyaline, one celled, ovoid (Bose, 1961).

On decorticated wood or twigs. Most common in eastern North America; also reported from India, South Africa (Bose, 1961), Uganda, Ghana (Sivanesan, 1972).

Material examined: North America: Ontario: ex Univ. Toronto Crypt. Herb. 2619 (NY). Pennsylvania: authentic collection of *S. diffusa* ex Herb. Schweinitz (IMI, slide; NY, UPS). Illinois: Ellis & Everhart N.A.F. 2549 (MASS, NY, DAOM). Idaho: Bonner Co., 5 Jun 1940, Slipp 657 (MASS, UIFP 2357). South Carolina: authentic collection of *S. parietalis* ex Herb. Curtis (IMI, slide; UPS). Georgia: GA 7877 (GA). Alabama: R. P. Burke, Fungi of Montgomery Co., no. 325 (NY).

Byssosphaeria jamaicana (Sivanesan) Barr, comb. nov.

Fig. 48

Herpotrichia jamaicana Sivanesan, Mycol. Pap. 127: 35. 1972.

Ascomata 340-550 µm diam, globose, with numerous dependent brown hyphal appendages, as subiculum beneath gregarious ascomata; pore area pallid; peridium 50-60 µm wide, dark reddish brown externally. Asci 80-120 x 12-15 µm. Ascospores 25-35 x (5-)7-8 µm, 1-3-septate, light to clear brown, fusoid, ends ± acute; constricted at primary septum; no appendages seen.

On decorticated rotting wood. West Indies.

Material examined: Jamaica: 1909, A. E. Wight (holotype, FH). Puerto Rico: Espinosa, 2 Mar 1915, J. A. Stevenson 2627 (NY); Explorations of Porto Rico n. 1817, F. J. Seaver and C. E. Chardon, 1923 (NY). Trinidad: Matchepoori, 11 Mar 1921, F. J. Seaver, Plants of Trinidad n. 3128 (NY).

Byssosphaeria jamaicana is now known from two collections made in Puerto Rico and one in Trinidad, in addition to the type from Jamaica. It probably is much more widespread than these records indicate. I suspect that some collections identified as "*Herpotrichia schiedermayeriana* with pallid pore region" belong instead to *B. jamaicana*.

Byssosphaeria oviformis Barr, sp. nov. Figs. 49, 50

Ascomata ovoidea 1-1.5 mm diametro et lato gregaria, prope basin in ligno denigrato immerso. Asci bitunicati cylindrici 120-130 x 7-9 µm. Pseudoparaphyses trabeculatae. Ascosporae 25-30 x (2.5-)3-3.5 µm hyalinae fusoideae uniseptatae.

Holotypus in ligno decorticato "vicinity of Windsor Cave, 140 m, 18°21' N, 77°39' W, Trelawney Parish, Jamaica, 21 Apr 1981" leg. W. R. Buck n. 5949 (holotypus, NY; isotypus, MASS).

Ascomata superficial, bases in substrate, gregarious; ovoid, 1-1.5 mm diam and high; apex tapered to blunt papilla, opening by rounded pore; surface dull black; peridium firm, carbonaceous, 100-130 µm wide, composed of numerous parallel compressed layers of cells, vertically oriented at the base, vinaceous brown, with hyaline internal layers. Asci bitunicate, peripheral, cylindric, 120-130 x 7-9 µm. Pseudoparaphyses trabeculate. Ascospores 25-30 x (2.5-)3-3.5 µm, hyaline, narrowly fusoid; one septate, not constricted, septum median; three globules or clusters of guttules in each hemispore, i.e., potentially several septate; wall smooth; overlapping biseriate in the ascus.

On blackened decorticated wood, known only from type.

In the ascomata without subiculum, seated on blackened substrate surface, and in narrow ascospores that remain hyaline and one septate for considerable time, *B. oviformis* is related most closely to *B. semen*. The latter species has smaller, more globose ascomata and slightly broader ascospores. *Byssosphaeria jamaicana* differs from both in possession of tomentum of dependent appendages and broader ascospores.

Byssosphaeria rhodomphala (Berkeley) Cooke, Grevillea 15: 81. 1887. Fig. 42

Sphaeria rhodomphala Berkeley, J. Bot. London 4: 313. 1845.

Herpotrichia rhodomphala (Berkeley) Saccardo, Syll. Fung. 2: 212. 1883.

Herpotrichia diffusa var. *rhodomphala* (Berkeley) Ellis & Everhart, Proc. Acad. Nat. Sci. Philadelphia 47: 21. 1895.

Sphaeria rhodosticta Berkeley & Broome, J. Linn. Soc. London 14: 126. 1873.

Herpotrichia rhodosticta (Berkeley & Broome) Saccardo, Syll. Fung. 2: 213. 1883.

Didymotrichia rhodosticta (Berkeley & Broome) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Neopeckia rhodosticta (Berkeley & Broome) Saccardo, Syll. Fung. 11: 317. 1895.

Sphaeria lanuginosa Berkeley & Curtis, Grevillea 4: 108. 1876.

Melanopsamma lanuginosa (Berkeley & Curtis) Saccardo, Syll. Fung. 1: 577. 1882.

Amphisphaeria subiculosa Ellis & Everhart, J. Mycol. 2: 103. 1886.

Nectria chaetostroma Ellis & McBride, Bull. Lab. Nat. Hist. Iowa State Univ. 4: 70. 1896.

Macbridella chaetostroma (Ellis & McBride) Seaver, Mycologia 1: 195. 1909.

Letendraea chaetostroma (Ellis & McBride) Weese, Sitzungsber. Akad. Wiss. Wien, Math.-Naturwiss. Cl., Abt. 1, 125: 512. 1916.

Herpotrichia rhodospiloides Peck, Bull. Torrey Bot. Club 36: 155. 1909.

Ascomata superficial, scattered or gregarious on ample subiculum, globose or turbinate, 220-500 µm diam, apex rounded plane, opening by rounded pore, often puckered or sulcate around pore; surface dull black, with red, orange, or yellow pulverulence around pore; peridium 20-60 µm wide above, 40-45 µm wide at base, pigment leaching from apical cells in KOH. Asci (50-)85-120 x 10-13 µm. Ascospores (16-)18-23(-25) x (5-)6-7.5(-9) µm, light brown, ends obtuse, 1-(3-)septate; faintly longitudinally striate, occasionally bearing delicate hyaline appendages over ends.

Anamorph: *Pyrenochaeta*-like; pycnidia formed in culture, 130-170 µm diam, with hyphal appendages; conidiogenous cells phialidic, lining cavity, 5-10 x 4-6 µm; conidia 6.5-10 x 3-4 µm, hyaline, one celled, ellipsoid, oblong or ovoid

(Samuels and Müller, 1978).

On wood and bark of various trees. Cosmopolitan.

Material examined: Numerous collections from tropical and temperate regions of North and South America, Africa, Asia. Selected collections: North America: Ohio: ex Berkeley herb., *Sphaeria rhodomphala* (UPS). Kansas: Bartholomew Fungi Col. 3632 as *Herpotrichia diffusa*. Missouri: Ellis & Everhart N.A.F. 2130 as *Amphisphaeria subiculosa*; Rabenhorst-Winter-Pazschke Fungi eur. 3960; DAOM 90017 (DAOM). Arkansas: holotype of *Herpotrichia rhodospiloides* (NYS), also distributed as Fungi Col. 2835. Georgia: GA 7979 (GA). South Carolina: Curtis,*Sphaeria rhodomphala* (UPS); Ravenel 1595 (MASS). Louisiana: Flora Ludoviciana 382, holotype of *Amphisphaeria subiculasa* (NY). Ceylon: slide ex holotype of *Sphaeria rhodosticta* (IMI); specimen (UPS).

This species was separated from *Herpotrichia diffusa* by Bose (1961), who utilized ascospore shape: ellipsoid with obtuse ends for *H. rhodosticta*, fusoid with acute ends for *H. diffusa*. Normally the ascomata differ in pigmentation around the pore region also, with *Byssosphaeria rhodomphala* having reddish, orange or yellowish granular deposit and *B. diffusa* grayish white. Both Bose and Sivanesan (1972) used the specific epithet *rhodosticta*, and assigned *Sphaeria rhodomphala* to synonymy with *Herpotrichia diffusa*. The ascospores of *Sphaeria rhodomphala* are larger (25 x 7.5 µm) than those of *S. diffusa*. In addition, authentic specimens named as *Sphaeria rhodomphala* by Berkeley in Fries's Herbarium in UPS are reddened about the apical pore. It is concluded that *Sphaeria rhodomphala* is the earliest name for this species that occurs in both temperate and tropical regions.

Byssosphaeria salebrosa (Cooke & Peck) Barr, comb. nov.
Figs. 51, 52

Sphaeria (Denudatae) salebrosa Cooke & Peck, New York State Mus. Rep. 29: 61. 1878.
Amphisphaeria salebrosa (Cooke & Peck) Saccardo, Syll. Fung. 1: 726. 1882.
Trematosphaeria salebrosa (Cooke & Peck) Sivanesan, Trans. Brit. Mycol. Soc. 65: 397. 1975.
Herpotrichia incisa Ellis & Everhart, Proc. Acad. Nat. Sci. Philadelphia 45: 130. 1893.

Ascomata 440-800 µm diam, globose or ovoid, scattered or gregarious on sparse subiculum or on blackened substrate; surface irregularly roughened with projecting masses of cells, dull black; peridium 30-35 µm wide at sides, up to 55-100 µm at base, of thick-walled, small brown cells, cells around pore yellowish, not leaching pigment in KOH. Asci 120-150 x 13-16.5 µm. Ascospores (30-)40-50 x (6-)7-9 µm, hyaline, soon light brown, fusoid, ends acute, 1-(3-5-)septate, constricted at median primary septum only.

On woody substrates. Eastern North America.

Material examined: Ontario: dead roots of *Acer spicatum*, London, 15 Apr 1892, J. Dearness (holotype of *Herpotrichia incisa*, NY). New York: on branches of *Vaccinium* or *Andromeda*, Center, Oct, C. H. Peck (holotype of *Sphaeria salebrosa*, NYS).

This species has ascospores much like those of *Byssosphaeria schiedermayeriana*, although no appendages were found on the ascospores, and they tend to range longer. The subiculum is sparse and the ascomata are quite rough and irregular, without any reddened area at the apex.

Byssosphaeria schiedermayeriana (Fuckel) Barr, comb. nov.
Figs. 38-41

Herpotrichia schiedermayeriana Fuckel, Jahrb. Nass. Ver. Naturk. 27-28: 27. 1873.
Sphaeria cirrhostoma Berkeley & Broome, J. Linn. Soc. London 14: 126. 1873.
Lasiosphaeria cirrhostoma (Berkeley & Broome) Saccardo, Syll. Fung. 2: 201. 1883.
Herpotrichia cirrhostoma (Berkeley & Broome) Petch, Ann. Roy. Bot. Gard. Peradeniya 5: 291. 1912.
Sphaeria (Byssisedae) keitii Berkeley & Broome, Ann. Mag. Nat. Hist. 17: 144. 1876.
Byssosphaeria keitii (Berkeley & Broome) Cooke, Grevillea 7: 84. 1879.
Herpotrichia keitii (Berkeley & Broome) Saccardo, Syll. Fung. 2: 212. 1883.
Psilosphaeria (Zignoella) keitii (Berkeley & Broome) Cooke, Grevillea 16: 51. 1887.
Lasiosphaeria keitii (Berkeley & Broome) Berlese, Icon. Fung. 1: 114. 1892.
Herpotrichia tonkiniana Patouillard, Bull. Soc. Mycol. France 8: 51. 1892.
Herpotrichia schiedermayeriana var. *caldariorum* P. Hennings, Hedwigia 34: 102. 1895.
Xenonectria caldariorum (P. Hennings) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 129: 150. 1920.

Herpotrichia sabalicola P. Hennings, Verh. Bot. Ver. Prov. Brandenb. 40: 154. 1898.
Neopeckia roberti Starbäck, Ark. Bot. 5: 16. 1905.
Neopeckia nobilis Rick, Broteria 5: 44. 1906.
Herpotrichia philippinensis Rehm, Leafl. Philipp. Bot. 6: 2203. 1914.
Neopeckia rhodosticta var. *magnifica* Rehm, Leafl. Philipp. Bot. 8: 2947. 1914.
Herpotrichia bakeri Sydow, Ann. Mycol. 15: 203. 1917.
Neopeckia rhodostoma Sydow, Ann. Mycol. 15: 204. 1917.
Neopeckia brasiliana Viegas, Bolm. Soc. Bras. Agron. 9: 2. 1946.

Ascomata scattered or gregarious, dependent appendages formed from lower sides and spreading on substrate as subiculum; globose or ovoid, 500-825 µm diam; dull black below, red or orange around pore region; peridium 50-100 µm wide. Asci (80-)100-150 x 12-15 µm. Ascospores (25-)32-42 x 5-8(-9) µm, light brown, 1-(3-5-)septate.

Anamorph: formed in culture, pycnidia 70-500 µm diam, with hyphal appendages; conidiogenous cells phialidic, lining cavity, 5-8 x 4-6 µm, or more elongate, 5-10 x 3-6 µm; conidia 2.5-3.5(-4) x 1.5-2(-3) µm, hyaline, ellipsoid or subglobose (Samuels and Müller, 1978).

On varied substrates, rotting logs and branches, endocarps of coconut, culms and petioles, on wood or cord in greenhouses. Cosmopolitan in warmer regions.

Material examined: numerous collections from tropical North and South America, Africa, Asia; also from Germany, Italy, Britain. North America: Florida: Collier Co., 1 Jan 1972, K. P. Dumont et al. (NY). Louisiana: Fungi Col. 1035; Flora Ludoviciana 2463 (NY).

The synonymy is essentially that prepared by Sivanesan (1972) but without those names (*albidostoma, incisa*) that do not accord with this taxon in my interpretation. *Byssosphaeria schiedermayeriana* is typically a tropical species, although it was originally discovered in the European Alps on *Sambucus* branches. The large ascomata with orange, bright or dull reddish plane apices are striking. Ascomata, asci and ascospores are larger than in the similar-appearing *B. rhodomphala*, but their kinship is notable. When Berkeley and Broome described *Sphaeria keitii* they suggested that it might be of exotic origin and thought it could be related to *S. rhodosticta* (= *B. rhodostoma*). Although many collections of North American tropical specimens have been labelled as "*Herpotrichia albidostoma*" the original of this species is a true *Herpotrichia* and is identical with *H. macrotricha*. Similarly shaped and sized ascospores account for the confusion. In the temperate-zone *H. incisa* (=*Byssosphaeria salebrosa*), ascospores are again quite similar, but the ascomata differ markedly.

Byssosphaeria semen (Cooke & Peck) Barr, comb. nov.
Figs. 53, 54
Sphaeria semen Cooke & Peck, New York State Mus. Rep. 29: 65. 1878. (name only, Rep. 26: 87. 1874).
Metasphaeria semen (Cooke & Peck) Saccardo, Syll. Fung. 2: 170. 1883.

Ascomata 400-600 µm diam, 330-550 µm high, globose or somewhat depressed; without appendages or subiculum, surface crustose and roughened; pore area pallid; peridium thick, 40-84 µm wide, outer region reddish brown, inner region hyaline. Asci 80-110 x 9-12 µm. Ascospores 20-30 x 3.5-4.5(-6) µm, hyaline becoming light brown, fusoid, ends tapered and acute, 1-(3-)septate, constricted at median septum; delicate appendages at each end.

On decaying petioles of *Sorbus* sp., rotting hardwood. Eastern North America.

Material examined: New Hampshire: Barr 3915 (MASS). New York: Sandlake, Sep 1872, C. H. Peck (holotype, NYS); Sandlake, no date, C. H. Peck (NYS).

This species is smaller than *B. salebrosa*, but it is obviously related by the surface of ascomata that is roughened but not appendaged.

Byssosphaeria xestothele (Berkeley & Curtis) Barr, comb.nov.
Figs. 43, 44
Sphaeria xestothele Berkeley & Curtis, Grevillea 4: 107. 1876.
Lasiosphaeria xestothele (Berkeley & Curtis) Saccardo, Syll. Fung. 2: 194. 1883.
Herpotrichia xestothele (Berkeley & Curtis) Berlese, Icon. Fung. 1: 107. 1894.
Eriosphaeria xestothele (Berkeley & Curtis) Dearness & House in Seymour, Host Index of the fungi... 543. 1929.
Herpotrichia schiedermayeriana var. *xestothele* (Berkeley & Curtis) Sivanesan, Mycol. Pap. 127: 20. 1972.

Ascomata 330-440 µm diam, 330-550 µm high, globose or ovoid, reddish around pore area, hyphal appendages dependent and forming subiculum with gregarious ascomata or occasionally forming compound structures of several centra surrounded by common outer peridium; peridium bright red in section in apical region, reddish brown below, of small-celled pseudoparenchyma, thick walled, 30-52 µm wide. Asci 70-100 x 9-12 µm. Ascospores hyaline becoming light brown, 20-26 x 4.5-6 µm, 1-3-septate, constricted at median septum, fusoid, tapered to ± acute ends; usually bearing delicate appendages, faintly longitudinally striate.

On fallen branches of *Cornus florida* or old leathery leaves. Eastern North America, Mexico.

Material examined: South Carolina: Society Hill, Apr 1855, Curtis (isotype of *Sphaeria xestothele*, Curtis Herb. in FH). Mexico: old leaves of *Loranthus crassipes*, Hacienda de Tamasopo, San Luis Potosi, 16 Dec 1891, ex Pringle Plantae Mexicanae 3978 (MASS).

Sivanesan (1972) considered this taxon to be only a small variety of *Herpotrichia schiedermayeriana* but it appears to be separable at the species level in comparison with the other species in the genus.

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HERICIUM CORALLOIDES N. AMER. AUCT. (= *H. AMERICANUM* SP. NOV.) AND THE EUROPEAN *H. ALPESTRE* AND *H. CORALLOIDES*

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SUMMARY

Cultures of a fungus known as *Hericium coralloides* in North America were not compatible in mating experiments with four other species of *Hericium*, including *H. coralloides* and the morphologically similar *H. alpestre*, a European species also often labelled *H. coralloides*. This genetic isolation, in addition to geographic and substrate differences from *H. alpestre*, prompted recognition of the North American fungus as a distinct species, herein named *H. americanum* sp. nov.

In 1975 I began to describe and compare the cultural features of the North American species of *Hericium*. It soon became evident that the problem was not as straightforward as it appeared initially and the project was expanded to include study of interfertility types, the conspecificity of certain cultures as well as the conspecificity of several *Hericium* species reported to be in North America and Europe. Most of these results will be published later.

This report deals with the application of the name "*Hericium coralloides* (Scop.:Fr.) S. F. Gray". Two species in Europe have been labelled *H. coralloides* (Hallenberg 1983). The neotypification of the name by Hallenberg (1983) should result in the name being applied to only one fungus. As a result of neotypification, the names *H. clathroides* (Pallas:Fr.) Pers. and *H. ramosum* (Bull.) Let. become synonyms of *H. coralloides* and the name *H. alpestre* Pers. is the earliest name for the "*H. coralloides*" of many European authors, e.g., Maas Geesteranus (1959).

In North America, we, e.g., Harrison (1973), labelled as "*H. coralloides*" a fungus which seemed identical to what is now named *H. alpestre*. To determine whether the North American and European fungi were conspecific a series of intercollection matings have been evaluated. As a result a new name, *H. americanum*, is proposed for the North American fungus.

MATERIALS AND METHODS

Monokaryon cultures used in mating tests were derived from the following:

H. americanum

1) DAOM F2167: USA, Pennsylvania, from basidiome on *Platanus*.
2) DAOM 21467: Canada, central Ontario, from decay in *Acer saccharum*.
3) Basham 467-KO: Canada, Ontario, Swan Lake, from decay in *Betula alleghaniensis*.

H. alpestre

4) Culture 392: Austria, Steiermark, Koralpe, Kalbenwald, from basidiome on *Abies alba*, coll. N. Hallenberg.
5) Culture 407: same data as no. 4.

H. coralloides as neotypified by Hallenberg (1983).

6) FP 59062-S: USA, Virginia, from basidiome on *Acer* or *Fagus*.
7) DAOM 22531: England, Epping Forest, from basidiome on *Carpinus* or *Fagus*, FPRL 60.

The fungi were grown at 25°C on 1.25% malt agar in plastic Petri dishes. Monokaryons representing each of the four mating types were used from no. 3 and three mating types were available from nos. 4 and 7. The mating types of the remaining monospore cultures were not determined. All cultures are preserved at DAOM and several are at the institutions acknowledged.

In each mating a monokaryon was paired with a monokaryon from a different specimen. After the mycelia had grown together the mats were examined for the presence of clamp connections. Hyphae from both the zone of convergence and from the opposite margin of each mat were observed. In Table 1 the negative (-) symbol indicates that no clamps were found and those matings were judged to be incompatible.

RESULTS AND DISCUSSION

All matings between *Hericium alpestre* and *H. coralloides* from Europe and *H. americanum* of North America were negative (Table 1). The data indicate that *H. americanum* is genetically distinct from both *H. alpestre* and *H. coralloides*, the two other species which have been labelled *H. coralloides*. Matings (Ginns unpubl.) involving isolates from an additional 33 specimens confirmed that *H. americanum* was distinct from *H. abietis* (Weir ex Hubert) K. Harrison and *H. erinaceus* (Bull.:Fr.) Pers., the two other North American species of *Hericium*.

The basidiomes of *Hericium americanum*, characterized by branches which bear spines in terminal clusters and spores 5.5-7µm diam, are different from *H. coralloides* sensu neotype which has spines arranged on the underside of branches like teeth on a comb and spores 3-5µm diam. The basidiomes of *H. americanum* and *H. alpestre* are very similar but have not been critically compared, partly due to the scarcity of basidiomes of *H. alpestre* (cf. Hallenberg 1983). *Hericium alpestre* appears to be restricted to the mountains of central and southern Europe, where it occurs almost entirely on recently cut stumps and fallen stems of *Abies alba* (Hallenberg 1983). The North American fungus is found in eastern North

Table 1. Results of matings between monokaryon cultures of *Hericium americanum*, and *H. alpestre* and *H. coralloides*.

		H. americanum														
		F2167[a]			21467						467-KO					
		1[b]	4	5	1	2	4	5	6	10	2	3	4	5	6	10
H. alpestre																
392[a]	1[b]	0[c]	–[d]	–	0	–	–	–	–	–	0	0	–	–	–	–
	2	0	–	–	0	–	–	–	–	–	0	0	–	–	–	–
	3	0	–	–	0	–	–	–	–	–	0	0	–	–	–	–
	4	0	0	0	0	–	–	–	–	–	0	0	–	–	–	–
407	4	0	–	–	0	–	–	–	–	–	0	0	–	–	–	–
H. coralloides																
50962	1	–	–	0	–	–	0	–	0	0	–	–	–	0	–	0
	2	–	–	0	–	–	0	–	0	0	–	–	–	0	–	0
	3	–	–	–	–	–	0	–	0	0	–	–	–	0	–	0
	4	–	–	0	–	–	0	–	0	0	–	–	–	0	–	0
	5	0	–	–	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	–	–	0	0	0	0	0	0	0	0	0	0	0	0
22531	1	–	–	0	0	–	–	–	0	0	–	–	–	–	0	0
	2	–	–	0	0	–	–	–	0	0	–	–	–	–	0	0
	3	–	–	0	0	–	–	–	0	0	–	–	–	–	0	0
	4	–	–	0	0	–	–	–	0	0	–	–	–	–	0	0

a: culture number; b: arbitrary number assigned to each monokaryon culture; c: zero indicates that no mating was attempted; d: negative symbol indicates incompatible mating (i.e., no clamp connections were formed).

America, extending as far west as Lake Superior. It occurs on a variety of broad-leaved tree species and infrequently on coniferous trees (Harrison 1973, Ginns unpubl.). Thus the geographic isolation of the North American "*H. coralloides*", its distinct substrate preferences, and its genetic isolation from *H. alpestre* as well as the other *Hericium* species convinced me that the North American fungus should be recognized as a distinct species.

Hericium americanum sp. nov.

Hericium alpestre affinis, sed segregatus genetice et geographice. Holotypus: USA: Pennsylvania: Houserville, 5 Nov. 1931, in *Platano*, ut *H. erinaceus*, L.O. Overholts Herb. 14844 (PAC). Culture DAOM F2167.

A detailed description and illustration of the basidiomes appeared in Harrison (1973) labelled as "*H. coralloides*".

Acknowledgements: Cultures were kindly supplied by N. Hallenberg, Botanical Institute, Göteborg, Sweden, and Frances F. Lombard and H. H. Burdsall, Forest Products Lab., Madison, Wisconsin, USA.

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MYCOTAXON

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STELLOSPORA GEN. NOV. (HYPHOMYCETES)

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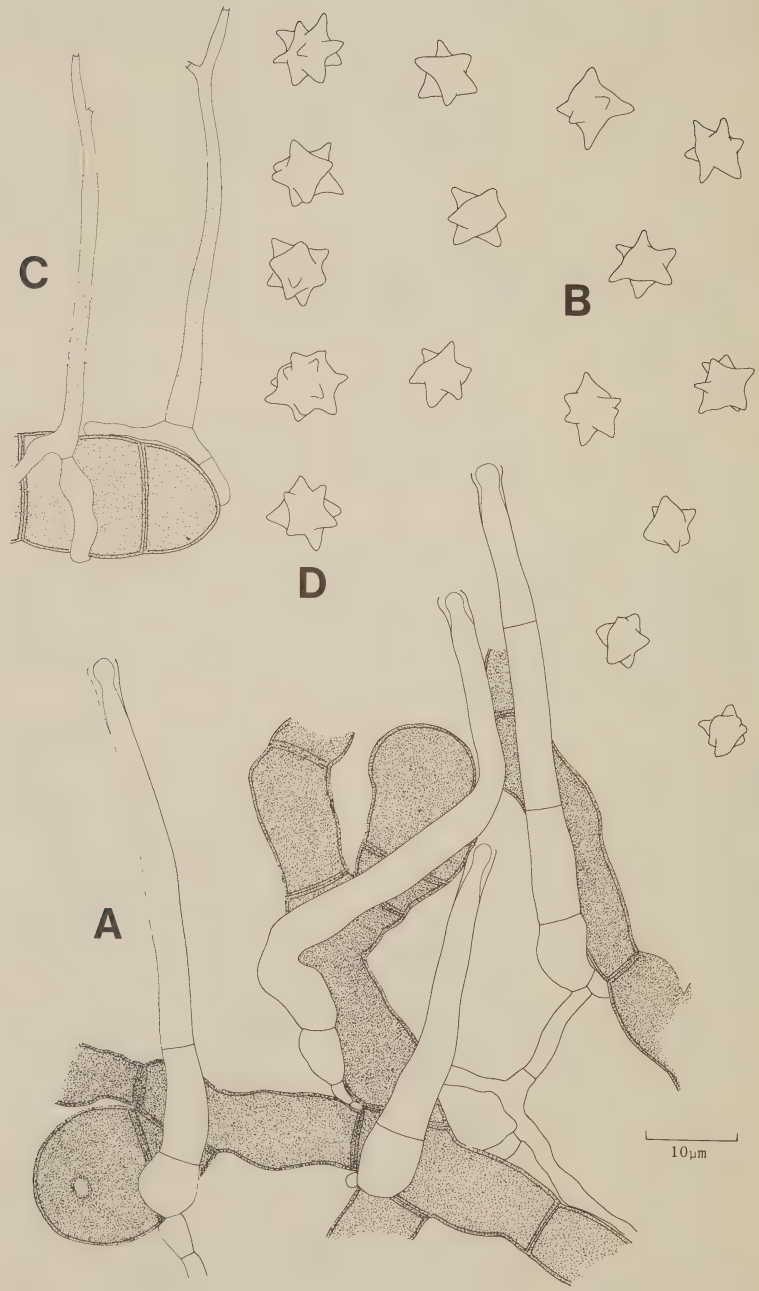
An interesting hyphomycete overgrowing colonies of *Appendiculella calostroma* (Desm.) Höhnel on *Rubus* in eastern Australia and the Philippines has characters which separate it from morphologically similar fungi known to us. The differences appear of sufficient magnitude to warrant the erection of a new genus.

Stellospora appendiculellae gen. et sp. nov. (Fig. 1)
Deuteromycotina, Hyphomycetales.
Hyphae hyalinae vel subhyalinae, ramosae, septatae, laeves, in hyphis hospitis superficiares vel immersae, 2-3 µm diam. Conidiophora macronematosa, mononematosa, simplicia vel ramosa, recta vel flexuosa, laevia, septata, cylindrica, hyalina vel subhyalina, ad basim interdum tumida, 43-90 x 4-6 µm. Cellulae conidiogenae enteroblasticae, monophialidicae, terminales, in conidiophoris incorporatae, determinatae, hyalinae, angustatae, ad apicem collo praedita 3-6 µm latae, 34-50 µm longae, ad basim 4-4.5 µm latae, sub apicem 2-2.5 µm latae. Conidia hyalina, continua, stellata, 5-10 µm lata, in capitula globosa apicalia agglutinata.

In coloniis *Appendiculellae calostromatis* in foliis *Rubi moluccani* L., Palen Ck., Queensland, 15 April 1979, J.H. Simmonds, IMI 239528, holotypus; isotypus BRIP 12866.

The fungus forms white patches on the black colonies of the substrate. This association appears to be deleterious to growth and sporulation by the affected colonies of


C
B
D
A
10µm

Appendiculella calostroma. Hyphae sparse, hyaline to subhyaline, septate, branched, superficial on hyphae of the host or internal, smooth, 2-3 μm diam. Conidiophores macronematous, mononematous, unbranched or once-branched near base, straight or flexuous, hyaline to subhyaline, smooth, tapered cylindrical, sometimes swollen to 6-8 μm at the base, 1-4-septate, wall up to 1 μm thick at the base, 43-90 μm long, 4-6 μm diam. Conidiogenous cells monophialidic, integrated, terminal, determinate, hyaline, tapered, with a flared, sometimes recurved collarette, thickened internally at conidiogenous locus, 32-50 μm long, 3.5-5 μm diam. at the basal septum, 2-2.5 μm diam. subapically, and 3-6 μm diam. at the apex. Conidial initials endogenous, becoming semi-endogenous with maturation. Conidia hyaline, unicellular, at first globose with short blunt projections, eventually stellate with typically 6 papillae blunt to more or less acute, 5-10 μm diam.; some conidia elongated, 6-11 x 5-9 μm. The conidia aggregate in globose heads at the tip of the conidiogenous cell, and disperse poorly in lactophenol or lactofuchsin but freely in water.

This fungus resembles *Tuberculispora jamaicensis* Deighton & Pirozynski (1972) which also grows on superficial ascomycetes (Fig. 1, C & D). Conidiogenesis is clearly different, however, being phialidic in *Stellospora* and holoblastic in *Tuberculispora*. In the latter genus conidia are borne on denticles, and conidium secession is rhexolytic in contrast to the schizolytic type seen in *Stellospora*. The denticles of *Tuberculispora* are occluded, a feature not mentioned by Deighton and Pirozynski (1972). There are typically 6 papillae on conidia of *Stellospora*, whereas in *Tuberculispora* there are 8 or more. The association of *Stellospora* with depauperate colonies of *Appendiculella* suggests that it, like *Tuberculispora*, is hyperparasitic. Hyphae are both superficial and internal, and occasionally were observed growing out of a broken host hypha to form a conidiophore. We were unable to ascertain how host hyphae are penetrated.

The genus *Bahusutrabeeja* is superficially similar to *Stellospora*, producing hyaline appendaged conidia from simple phialides (Subramanian & Bhat 1977). It differs in

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Fig. 1. A,B. *Stellospora appendiculellae*, conidiophores and conidia (from IMI 239528).
C,D. *Tuberculispora jamaicensis*, conidiophores and conidia (from IMI 39266b).

having dematiaceous conidiophores and conidiogenous cells, which may proliferate percurrently, and filiform conidial appendages quite distinct from the conoid projections on conidia of *S. appendiculellae*. In addition the first-formed conidium in *Bahusutrabeeja* is obpyriform, while all others are globose. No such dimorphism occurs in *Stellospora*.

Specimens examined

Stellospora appendiculellae (all on *Appendiculella calostroma*)

Rubus moluccanus, Palen Ck., Qd., 15 April 1979, J.H. Simmonds, IMI 239528 (holotype), BRIP 12866 (isotype; additional material as BRIP 12865); *R. rosifolius* Smith, National Park, New South Wales, Oct. 1934, L.R. Fraser, DAR 2322 (slides as BRIP 13788); *R. rosifolius*, National Park, N.S.W., Nov. 1934, L.R. Fraser, DAR 2330 (BRIP 13789); *R. hillii* F. Muell., National Park, N.S.W., Nov. 1934, L.R. Fraser, DAR 2332 (BRIP 13790); *R. hillii*, National Park 96 km west of Wauchope, N.S.W., May 1983, D. Brown, DAR 44696d (duplicate as BRIP 14046); *R. fraxinifolius* Poir., Amboina, Philippines, July-Nov. 1913, C.B. Robinson 2115, IMI 25485 b.

Tuberculispora jamaicensis

Irenopsis aciculosa (Wint.) F.L. Stev. on *Bastardia viscosa* H.B. & K., road from Quickstem to Balmore Castle, Jamaica, 29 Dec. 1949, E.B. Martyn, IMI 39266 b.

Irenopsis cryptocarpa (Ell. & Mart.) Hansf. on *Gordonia lasianthus* (L.) Ell., Eustis, Lake Co., Fla, U.S.A., 28 May - 15 June 1895, G.V. Nash, *Plants of Florida* No. 1956 (slide, IMI 149075).

We are grateful to Mr J. Walker for lending specimens in DAR.

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Subramanian, C.V. and Jayarama Bhat, D. 1977. *Bahusutrabeeja*, a new genus of the hyphomycetes. *Canadian Journal of Botany* 55, 2202-2206.

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A PHOTOMEMOIR: IMC$_3$, TOKYO, JAPAN, 1983

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Ithaca, NY 14853 USA

No apologies are offered for technique or omissions among these 30 personal selections of my photographs. My hope is to allow an association of names and faces.

1. A. HENSSEN, West Germany
2. E. G. SIMMONS, U.S.A.
3. K. AOSHIMA, Japan
4. K. KATSUMOTO, Japan
5. R. A. SAMSON, Netherlands
6. T. SCHUMACHER, Norway
7. C. V. SUBRAMANIAN, India
8. P. F. CANNON, Great Britain
9. Y. KOBAYASI, Japan
10. H. DISSING, Denmark
11. W. GAMS, Netherlands
12. J. MORAVEC, Czechoslovakia
13. M. A. RIFAI, Indonesia
14. G. L. HENNEBERT, Belgium
15. I. SAITO, Japan
16. Y. OTANI, Japan
17. R.-y. ZHENG, China
18. T. YOKOYAMA, Japan
19. S. J. HUGHES, Canada
20. L. M. KOHN, Canada
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22. O. HILBER, West Hermany
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26. C. BAS, Netherlands
27. A. REIJNDERS, Netherlands
28. J. WEBSTER, Great Britain
29. G. J. SAMUELS, New Zealand
30. R. IMAZEKI, Japan

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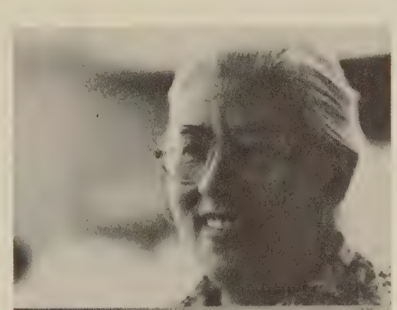

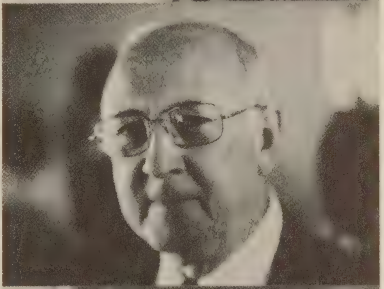

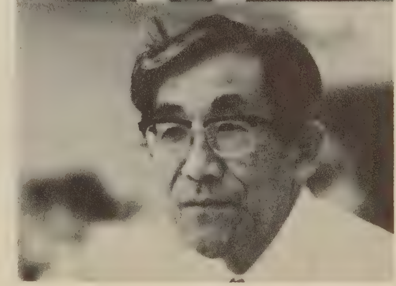

A.REIJNDE

MYCOTAXON

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EAST AFRICAN RUSTS (UREDINALES), MAINLY FROM UGANDA
2. ON CYPERACEAE

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SUMMARY

Eleven rust species on cyperaceous hosts are described. Seven species are described as new, viz. Puccinia morotoensis on Cyperus procerus and P. nabugaboensis on Rhynchospora gracillima ssp. subquadrata from Uganda, Puccinia petitianae on Carex petitiana and Uredo montis-elgonensis on Carex conferta from Kenya, and Puccinia cyperi-cristati on Cyperus cristatus, Uredo caricis-confertae on Carex conferta and U. fuirenae-strictae on Fuirena stricta from Tanzania. Two rust species are new to the flora of Uganda. Some new host species are recorded.

The material presented below is partly collected by myself in the autumn 1970 (cf. Gjærum 1983) and partly picked out from phanerogams preserved in the herbaria of Makerere University, Kampala (MHU) and of University of Oslo (O). The nomenclature of the hosts follows Haines & Lye (1983). My thanks are due to the curators of the said herbaria. I also want to thank Dr. G.B. Cummins, Dept. of Plant Pathology, University of Arizona, Tucson, AZ., U.S.A., for critically reading the manuscript.

Puccinia conclusa Thuem., J. Sci. Math. Phys. Nat. 24:10, 1878.

Syn. P. romagnoliana Maire & Sacc., Annls mycol. 1: 220, 1903.

On Cyperus latifolius Poir.

Masaka Distr., Kalungu Co., 3 km S of W. Mengo Border, 1140 m, 5.6.1971, leg. K.A. Lye (M107), II.

On Cyperus niveus Retz. var. leucocephalus (Kunth) Fosberg (syn. C. obtusiflorus Vahl)

Karamoja Distr., Pian Co., Escarpment S of Kapendongor, 1550 m, 10.6.1970, leg. K.A. Lye (5581) & A.B. Katende, II.

Urediniospores on C. latifolius 20-30 x 14-23 um, obovoid or ellipsoid to broad ellipsoid, wall 2.0-3.0 um thick, pale to dark cinnamon-brown, echinulate and with 2 equatorial, conspicuous pores. On *C. niveus* var. *leucocephalus* the urediniospores are larger than on the other hosts, measuring 29-38 x (21)24-29 um, otherwise they are similar.

P. conclusa, widespread on *Cyperus* spp. in Africa, in S. Africa also recorded on *Ficinia capitaltum* Nees, is a new member of the rust flora of Uganda. It has been found on *C. latifolius* in Malawi, but *C. niveus* var. *leucocephalus* seems to be a new host. Outside Africa it is widespread from the Mediterranean region to China and the Philippines.

Puccinia cyperi-cristati n.sp. (Fig. 1).

Uredinia et telia in pagina abaxiali foliorum. Urediniosporae 18-30 x 15-18 um, irregularissimae, angulatae, interdum rhomboideae, obovoideae, ellipsoideae vel subglobosae, parietibus 1-1.5 um crassis, cinnamomeis, echinulatis, poris duobus equatorialibus instructis. Telia paraphysibus, brunneis, epidermidi obtecta. Teliosporae clavatae vel fusiformes, saepe aliquantum curvatae, 43-54 x 12-17 um, parietibus c 1 um crassis, ad apicem usque 7 um incrassatis, pallide brunneis, laevibus, pedicello brevo, pallide brunneo.

Holotype: A. Bjørnstad 1312(O), 31.1.1972, Tanzania, Iringa Distr., Ruaha National Park, 7 km SW of Msembe, 900 m, on *Cyperus cristatus* (Kunth) Mattf. & Kük. (syn. *Kyllinga alba* Nees). Isotype in NPPI.

P. cyperi-cristati differs from other *Puccinia* species described on "Kyllinga" spp. especially in the very irregularly formed urediniospores.

To my knowledge no rust has previously been recorded for this host.

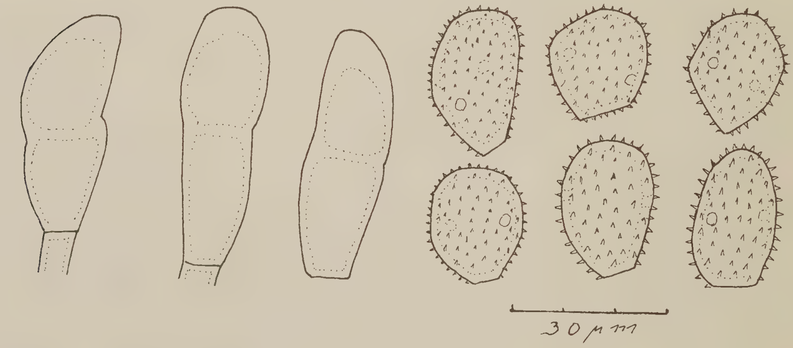

Fig. 1. *Puccinia cyperi-cristati*. Teliospores and urediniospores from type.

Puccinia cyperi-tagetiformis Kern, Mycologia 11: 138, 1919.

On *Cyperus digitatus* Roxb. ssp. *auricomus* (Spreng.) Kük.

Teso Distr., Serere Co., Serere Research Station, 1150 m, leg. Gj. (438), II.

On *Cyperus distans* L.f.

Bugisu Distr., Central Bugisu Co., near Busano, 1600-1700 m, 21.1.1969, leg. K.A. Lye (1664), II; Ankole Distr., Nyabushozi Co., Ruhengere Research Station, 1300 m, leg. Gj. (126), II, Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (132), II.

On *Cyperus esculentus* L.

Busoga Distr., Butembe Bunya Co., Jinja, at the Freshwater Fishing Research Station, 1150 m, leg. Gj. (105), II.

On *Cyperus fischerianus* A. Rich. s.lat. (aff. *C. pseudoleptocladus* Kük.)

Ethiopia. Shoa Distr., Wondo Gennet, 1800 m, 26.11.1970, leg. Gj., II+III.

On *Cyperus longus* L.

W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 7.1937, leg. Geldart, II.

On *Cyperus polystachyos* Rottb. ssp. *laxiflorus* (Benth.) Lye (syn. *Pycreus chlorostachos* (Boeck.) P. Beauv.)

W. Mengo Distr., Mawokota Co., 3-4 km N of Masaka Border, 1140 m, 1.2.1970, leg. K.A. Lye (5048) & R. Wh. Haines. II.

On *Cyperus purpureo-glandulosus* Mattf. & Kük. (syn. *Kyllinga sphaerocephala* Boeck)

W. Mengo Distr., Kyadondo Co., Namulonge, 1180 m, leg. Gj. (93), II, Makerere, 1200 m, leg. Gj. (6), II.

On *Cyperus richardii* Steud. (syn. *Kyllinga macrocephala* A. Rich.)

W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 7.1937, leg. Geldant, II, 21.11.1969, leg. K.A. Lye (4710), II, leg. Gj. (457), II; Ankole Distr., Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (195), II.

On *Cyperus rotundus* L.

W. Mengo Distr., Kyadondo Co., Port Bell, 1140 m, Gj. (49) II, Namulonge Research Station, 1180 m, leg. Gj. (91) II, Mpanga Forest, 1150 m, 4.1953, leg. E.M.L., II; Mubende Distr., Singo Co., Kiboga, 1170 m, leg. Gj. (309), II.

On *Cyperus* spp.

Busoga Distr., Butembe Bunya Co., Jinja, near Freshwater Fishing Research Station, 1150 m, leg. Gj. (106), II; Bunyoro Distr., Bujenje Co., Itutwe Borehole, 1050 m, leg. Gj. (338), II.

Kenya, Kilike, Mwatsuma River E of Mariakani 180 m, leg. 23.6.1971, leg. K.A. Lye & A. B. Katende (6772), II.

On *Fuirena leptostachya* Oliv.

Masaka Distr., Kalingu Co., 1 km SW of W. Mengo Border, 1140 m, 16.6.1971, leg. K.A. Lye (6620), II.

The specimens discussed here have obovoid or ellipsoid to globoid, cinnamon-brown to dark cinnamon-brown urediniospores, which are slightly thickened, a low hyaline membran, are more distinctly echinulate at apex, and with two equatorial pores. The spore sizes and wall thickness for each host species are given below:

C. digitatus ssp. *auricomus*	18-24 x 17-23 um,	wall 1.5-2 um
C. distans	(14-)16-24 x (12-)14-19 um,	wall 1.5-2 um
C. esculentus	17-24 x 16-21 um,	wall 1-1.5
C. fischerianus	20-27 x 16-21 um,	wall 1-1.5(-2.0) um
C. longus	20-27 x 14-21 um,	wall 1-1.5 um
C. polystachos ssp. *laxiflorus*	18-22 x 16-21 um,	wall (1.5-)2-2.5 um
C. purpureoglandulosus	19-27 x 16-21(-25) um,	wall 2-2.5 um
C. richardii	16-27(-34) x (12-)14-20 um,	wall 1.5-2 um
C. rotundus	(14-)16-27 x (12-)14-25 um,	wall 1.5-2 um
Fuirena leptostachya	(21-)25-32 x (16-)20-25 um,	wall 2-2.5 um

Gjærum (1977) discussed *P. cyperi-tagetiformis* var. *africana* Doidge (=*P. pegleriana* Dodge) and var. *madagascariensis* Bouriquet & Bassino and found them poorly delimited from the main type.

Kern (loc.cit.) placed *Uredo cyperi-tagetiformis* Henn. with *P. cyperi-tagetiformis* while the Sydows (1924) and later Jørstad (1956) placed it with *P. cyperi* Arth. However, Yen (1973) again placed it with *P. cyperi-tagetiformis*.

P. cyperi-tagetiformis is a new member of the rust flora of Uganda and Kenya, but it has been reported from other countries both in Eastern Africa (Ethiopia, Mocambique and Madagascar) and West-Africa (Gabon, Guinea, and Ivory Coast). It is widespread in the Americas, and it occurs also in India and China.

C. distans and *C. longus* are previously reported from Africa as hosts for this rust, while the other hosts mentioned are new. *Fuirena leptostachya* represents a new host genus.

Puccinia fimbristylidis Arth., Bull. Torrey Bot. Club 33: 28, 1906.
On *Fimbristylis miliaceae* (L.) Vahl (syn. *F. quinquiangularis* (Vahl) Kunth)
Kigezi Distr., Queen Elisabeth Park, Katajo, ca 950 m, 6.9.1964, leg. J.W. Lock (636a), II.

Urediniospores (21-)24-27(-31) x (12-)15-22(-25) um, ellipsoid to obovoid, sometimes irregularly angular, wall 1-1.5(-2) um thick, pale cinnamon-brown, echinulate and with 2 superequatorial pores.

P. fimbristylidis was published by Wakefield and Hansford (1949) on *F. exilis* Roem. & Schult. from Katakwi in Teso. An examination of Hansford's specimen 1632 (IMI) showed that the urediniospores have walls about 3 um thick. This might indicate a misidentification of either host or rust species. Of the rusts occurring on *Fimbri-*

stylis only the American species *P. superior* Jacks. has urediniospores with a wall thickness corresponding to those in the Hansford collection (in the diagnosis 3-4 um).

Other rust species with similar urediniospores occurring on *Fimbristylis* are the Asiatic *Puccinia flavipes* Syd. and *Uromyces kwangsianus* Cumm. Ramachar et al. (1978) when describing *P. fimbristylidis-ferrugineae* with 2 equatorial pores in the urediniospores, considered *P. flavipes* as a synonym of *P. fimbristylidis* (cf. also Saccardo 1912).

In Africa *F. miliacea* is a new host for this rust which inhabits *Fibristylis* spp. in America (Mexico, West Indies, S. America), Tropical Africa, East Asia and New Guinea.

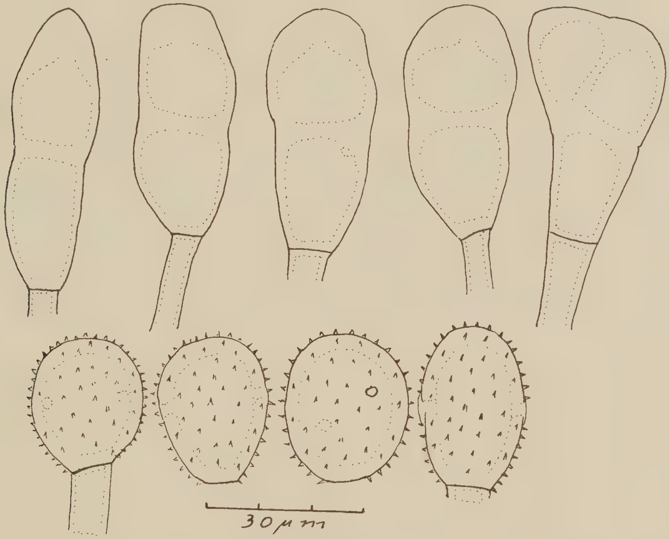

Fig. 2. *Puccinia morotoensis*. Teliospores and urediniospores from type.

Puccinia morotoensis n.sp. (Fig. 2).
Uredinia et telia in pagina adaxiali foliorum. Urediniosporae 23-34 x 18-26 um, obovoideae, ellipsoideae vel subgloboideae, parietibus 1.5-3 um crassis, cinnamomeis, echinulatis, poris duobus (-tribus) equatorialibus vel superequatorialibus instructis, papillis demissis hyalinis obsitis. Teliosporae 43-54(-63) x 20-25 um, clavatae, ad septum constrictae, parietibus lateralibus 1-1.5 um crassis, ad apicem usque 11 um incrassatis, laevibus, cinnamomeis, ad pedicello flavido dilutis. Teliosporae tricellulares raro.

Holotype: K.A. Lye 5657, A.B. Katende & D. Swinscow (MHU), 11.6.1970, Uganda, Karamoja Distr., Mathenico Co., SE of Sogolomon, Mt. Moroto, 2600 m on Cyperus procerus Rottb. Isotype in NPPI.

Material examined:

On Cyperus dubius Rottb. (syn. Mariscus dubius (Rottb.) Hutch.)

Bugisu Distr., Central Bugisu Co., 2-3 km N of Busoba, 1200 m, 31.5.1969, K.A. Lye (3176) II; Toro Distr., Queen Elisabeth Park, Mweya, main track, 950 m 8.4.1964, U. Lock (510) II.

On Cyperus procerus Rottb. (syn. Mariscus procerus (Rottb.) Hutch.)

Karamoja Distr., Matherrico Co., SE of Sogolomon, Mt. Moroto, 2600 m, 11.6.1970, K.A. Lye (5657), A.B. Katende & D. Swinscow, II + III (type).

In the three specimens listed above, there are a certain variation in thickness of the urediniospore walls. In the uredinospores on C. dubius collected by Lye (3176) the spore walls are on an average thinner and less distinctly echinulate, but the the spine patterns are similar.

On hosts previously ascribed to Mariscus, four species of Puccinia are described. Puccinia hennopsiana Doidge and P. mariscicola Yen have respectively 3-4 and 4-5 pores in the urediniospores. P. subtegulanae Cumm. has telia with paraphyses and smaller urediniospores with two pores, and thinner walls. Uredo marisci Yen also has smaller spores, while in P. marisci-sieberiani Saw. uredinia have paraphyses and spores with 3-4 pores.

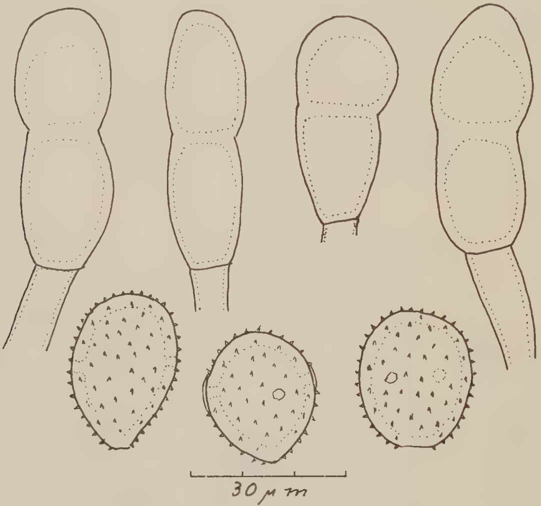

Fig. 3. Puccinia nabugaboensis. Teliospores and urediniospores from type.

Puccinia nabugaboensis n.sp. (Fig. 3).

Uredinea amphigena, ovata, 0.5 mm longa. Urediniosporae 23-28 x 20-28 um, obovoideae, ellipsoideae vel globoideae, parietibus 2.5-3 um crassis, cinnamomeis, echinulatis, poris duobus (-tribus) equatorialibus instructis. Telia uredinia conformes, interdum in uredinis posita. Teliosporae 38-47 x 16-20 um, ellipsoideae vel clavatae, ad apicem rotundatae vel truncatae, ad septum constrictae, facile separatae, parietibus lateralibus 1-1.5 um crassis, ad apicem usque 7 um incrassatis, dilute cinnamomeis, laevibus, pedicello pro longitudine 60 um excedenti, saepe brevi fracto, hyalino, collabenti.

Holotype: K.A. Lye 5011 & R.W.H. Haines (MHU), 1. Febr. 1970, Uganda, Masaka Distr. Buddu Co., 0.5-1 km S of Bake, Lake Nabugabo, 1140 m, on *Rhynchospora gracillima* Thw. ssp. *subquadrata* (Cherm.) J. Rayn. Isotype in NPPI.

To my knowledge six *Puccinia* species are recognized on *Rhynchospora*, five American and one Asian. Also three *Uromyces* species, all American, are described on *Rhynchospora*. The only African rust on this genus is *Uredo rhynchospora* Henn., described from Kisanthu, Zaire. This species has slightly smaller urediniospores, 18-26 x 15-20 um than has *P. nabugaboensis*, and with walls only 1.5-2 um thick (Sydow 1924).

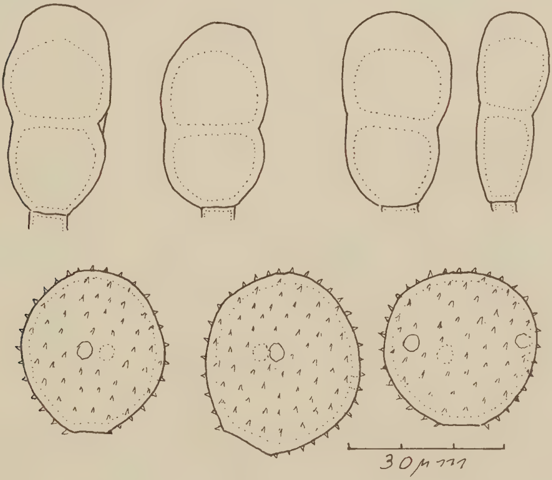

Fig. 4. *Puccinia petitianae*. Teliospores and urediniospores from type.

Puccinia petitianae n.sp. (Fig. 4).
Uredinia in pagina abaxiali foliorum, ovalia, 0.3 mm longa, brunnea. Urediniosporae subgloboideae vel globoideae, raro late obovoideae, 28-35 x 26-34 um, parietibus 1.5-2 um crassis, fulvis, echinulatis, poris (duobus-) tribus equatorialibus instructis, papillis demissis hyalinis obsitis. Telia in uredinia, pulvinata, fusca. Teliosporae obovoideae, raro clavatae, ad apicem et pedicellum rotundatae, ad septum leniter constrictae, 37-43 x (14-)19-22 um, parietibus cellulae inferioris minus 1 um crassis, in cellulae superioris leniter crassis, ad apicem usque 6.5 um incrassatis, fulvis, laevibus, pedicello hyalino vel fulvo, raro 10 um longiore, persistenti.
Holotype: K.A. Lye 1507 (MHU), 19.1.1969, Kenya, Kitale Distr., Mt. Elgon Region, Northern Mt. Elgon Road, 3000 m, on Carex petitiana A. Rich. (syn. C. fischeri K. Schum. Isotype in NPPI.

Doidge (1939) described Uredo caricis-petitianae on the same host from S. Africa, but the urediniospores are smaller, especially more narrow, and have a thicker wall.

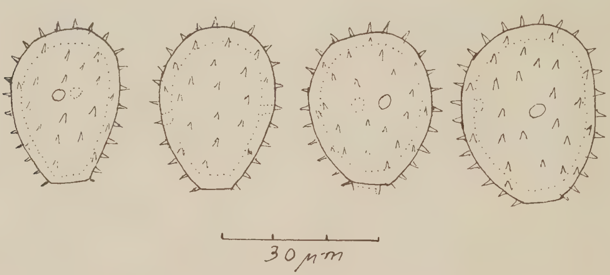

Fig. 5. Uredo caricis-confertae. Urediniospores from type.

Uredo caricis-confertae n.sp. (Fig. 5).
Uredinia amphigena, ovalea, 0.3 mm longa, epidermidi diu tectis, brunnea. Urediniosporae ovoideae vel ellipsoideae, raro angulariae, 25-32 x 19-27 um, parietibus 1.5-2.5 um crassis, fulvis, echinulatis, poris duobus equatorialibus instructis, papillis demissis hyalinis obsitis.
Holotype: K.A. Lye and A.B. Katende 4835 (MHU), 12.1.1970, Tanzania, Moshi Distr., Mt. Kilimajaro, near Lemosho gladea on Carex conferta A. Rich. Isotype in NPPI.

To my knowledge only four rust species are previously reported on Carex spp. from Africa, and none of them correspond to the species described above. Puccinia dioicae Magn. has superequatorial pores in the urediniospores while P. caricina DC. has 3-4, occasionally 2 pores. P. caricis-cernuae Doidge has smaller urediniospores with obscure pores. More narrow urediniospores have Uredo caricis-petitianae Doidge, and they also have 2-3 pores while U. caricis-confertae has

only 2. P. petitianae described in this paper has larger urediniospores with mostly 3 pores.

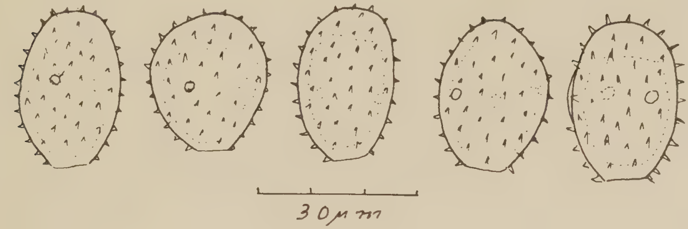

Fig. 6. Uredo fuirenae-strictae. Urediniospores from type.

Uredo fuirenae-strictae n.sp. (Fig. 6).
Uredinia in pagina adaxiali foliorum. Urediniosporae 30-38 x (21-) 24-31 um, obovoideae, parietibus 1.5-2 um crassis, ad apicem usque 9 um incrassatis, aureo-brunneis, echinulatis, poris duobus-tribus equatorialibus instructis.
Holotype: R.W. Haines 4115 (MHU), Kenya, Narasha Lake, near Timboroa, 2100 m, 13.4.1966, on Fuirena stricta Steud. ssp. chlorocarpa (Ridl.) Lye. Isotype in NPPI.
Material examined:
On Fuirena stricta Steud. ssp. chlorocarpa (Ridl.) Lye
Kenya. Narasha Lake, near Timboroa, 2100 m, 13.4.1966, R.W. Haines (4115), II (type).
Tanzania. Iringa Distr., Ruaha National Park, 2.5 km SSW of Magangwe Ranger Post, 1370 m, 20.12.1972, A. Bjørnstad (2198), II.

The Tanzanian specimen has slightly smaller spores than has the type specimen (27-34 x 20-25 um), but they are otherwise similar.

U. fuirenae-stricta differs from P. fuirenae Cke. which urediniospores are more narrow, from P. fuirenae-pubescentis Maire which urediniospores have 1-2 pores, on the drawing shown to be more superequatorial, from P. fuirenella Doidge in having thinner urediniospore walls with 2 pores and from P. fuirenicola Arth. which has thicker urediniospore walls. Viennot-Bourgin (1953) indicated that P. fuirenae-pubescentis and P. fuirenicola are conspecific.

Uredo montis-elgonensis n.sp. (Fig. 7).
Uredinia amphigena, ovalia, 0.3-0.5 mm longa, brunnea. Urediniosporae obovoideae, 28-34 x 21-24 um, parietibus 2.5-3.5 um crassis, castaneo-brunneis, echinulatis, poris duobus equatorialibus instructis.
Holotype: A.C. Hamilton (MHU), 19.12.1966, Kenya. Mt. Elgon, ca 3500 m, on Carex conferta A. Rich. Isotype In NPPI.

This species differs from *uredo caricis-confertae* in having spores with thicker and darker coloured walls.

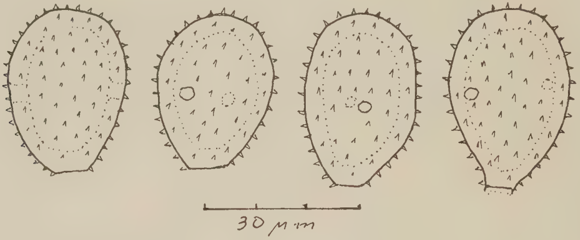

Fig. 7. *Uredo montis-elgonensis*. Urediniospores from type.

Uromyces notabilis Wakefield in Wakefield & Hansford, Proc. Linn. Soc. Lond., Sess. 161, 1948-49: 173, 1949.
On *Cyperus brevifolius* (Rottb.) Hassk. ssp. *intricatus* (Chern.) Lye (syn. *Kyllinga brevifolia* Rottb.)
W. Mengo Distr., Kyadondo Co., Kazi, 1140 m, Gj. (63), II.
On *Cyperus sesquiflorus* (Torr.) Mattf. & Kük. ssp. *cylindricus* (Nees) Koyama (syn. *Kyllinga cylindrica* Nees)
Bunyoro Distr., Bujenje Co., Budongo Forest 1050-1100 m, 16.5.1969, R.W. Haines (4521), II.
On *Cyperus sesquiflorus* (Torr.) Mattf. & Kük. ssp. *appendiculatus* (K. Schum.) Lye (syn. *Kyllinga odorata* Vahl var. *major* (C.B. Cl.) Chiov.)
Sebei Distr., Sebei Co., near Kapkwata, 2100 m, 20.1.1969, leg. K.A. Lye (1588), II.
On *Cyperus purpureo-glandulosus* Mattf. & Kük. (syn. *Kyllinga sphaerochepala* Boeck.)
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, Gj. (2), II; Mubende Distr., Buwekula Co., Mubende Hill, 1350 m, Gj. (498), II.

Urediniospores 18-29 x 14-21 um, ellipsoid to obovoid or subgloboid, wall 1 um thick, hyaline to pale cinnamon-brown, echinulate and with 2 equatorial pores, often obscure.
On *Cyperus aromaticus* (Ridl.) Mattf. & Kük. (syn. *Kyllinga polyphylla* Kunth)
Kigezi Distr., Queen Elizabeth National Park, Ishasha Camp, 980 m, 2.6.1970, K.A. Lye (5513) & A.B. Katende, II, and 0.5 km S of Kaizi River, 950 m, 2.6.1970, K.A. Lye (5518), II.

These two specimens are placed within *U. notabilis*, but they have larger urediniospores, (20-)23-32(-35) x 15-27(-29) um with a wall 1-1.5 um thick, thus approching *U. loculatus* Cumm., described on *Kyllinga* sp. from Zambia. However, these two rust species might be difficult to separate when only uredinia are present.

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EAST AFRICAN RUSTS (UREDINALES), MAINLY FROM UGANDA
3. ON AMARYLLIDACEAE, COMMELINACEAE, IRIDACEAE, JUNCACEAE, LILIACEAE, ORCHIDACEAE AND XYRIDACEAE

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SUMMARY

Twelve rust species on monocotyledonous host families are recorded. Uredo kabanyoloensis on Asparagus officinalis and Uromyces eulophiae on Eulophia paivaeana ssp. borealis from Uganda and Uromyces dipcadi on Dipcadi viride from Kenya are described as new. Uredo xyridis, a new member of the African rust flora, is reported from Uganda. The other species or stages are either new to Uganda or have been found on new hosts. Physopella tecta is new to Tanzania.

The material presented below originate mainly from the same sources as in Part 1 (Gjærum 1983) and Part 2 of this series of papers on East African rust fungi. I thank the curators of the herbaria mentioned in the text for lending me material for identification and for comparison. Dr. G.B. Cummins, Dept. of Plant Pathology, University of Arizona, Tucson, AZ, U.S.A., has read the manuscript critically and for which I am most grateful.

Aecidium hartwegiae Thuem. Flora 60: 411, 1877.
Syn. A. crini Kalchbr. Grevillea 19: 26, 1882.
On Ammocharis tinneana (Klotchy & Peyr.) Milne-Redh. & Schweick (syn. Crinum tinneanum Klotchy & Peyr.) (Amaryllidaceae)
Ankole Distr., Nyabushozi Co., 3 km SW of Kyibega, 1250 m, 21.4.1970, leg. K.A. Lye (M15), 0 + I.
Tanzania. Iringa Distr., Ruaha National Park, 0.5 km W of Ibuguziwa 29.12.1970, leg. I. Bjørnstad (389), 0 + I.

Pycnia in groups on the adaxial side of the leaves. Aecia on abaxial, rarely on the adaxial side of the leaves, densely aggregated. Peridia short, cupshaped. Aeciospores 18-26(-29) x (14-)16-24 um, ellipsoid or subgloboid, often angular. Wall about 1 um thick, hyaline, finely verrucose and with obscure, scattered pores.

This aecial stage has been reported as A. crini on several Crinum spp. from several African countries, but it is new to Uganda. The host represents a new genus. Outside Africa it is reported from India and Nepal. Patil & Thirumalachar (1969) proved that aecia on Crinum latifolium L. belonged to the graminicolous rust Uromyces clignyi Pat. & Har., and they made A. crini synonymous with A. hartwegiae.

Aecidium ornithogaleum Bub. Annls mycol. 3:223, 1905.
On Ornithogalum echlonii Schlecht. (Liliaceae)
Masaka Distr., Buddu Co., Mile 70 on road from Masaka to Mbarara, 1400 m, leg. Gj. (296), 0 + I; Kigezi Distr., Rubanda Co, Muko Research Station, 1300 m, leg. Gj. (117), 0 + I.

Pycnia on the adaxial side of the leaf, 130 µm wide, 180 µm deep. Aecia in clusters, abaxial. Peridium cupshaped, white. Aeciospores 17-23 x 16-19 µm, angularly globoid, ellipsoid, wall less than 1 µm thick, hyaline, finely verrucose with obscure, scattered pores.

The aecial stage on Ornithogalum spp. is widespread in Europe, and it is also reported from Morocco, S. Africa (on O. echlonii) and U.S.A. Tranzschel (1914) proved that this aecial stage belongs to P. hordei Otth. This stage is new to the flora of Uganda.

Physopella tecta (Jacks. & Holw.) Azbukina. Novit. system. plant. non vasc. 7: 223, 1970.

Syn. Phakopsora tecta Jacks. & Holw. in Jackson, Mycologia 18: 148, 1926.
On Commelina africana L. var. lanciespatha C.B. Cl. (Commelinaceae)
Tanzania. Iringa Distr. Ruaha Nat. Park, at the foot of Magangwe Hill, 1450 m, 10.5.1972, leg. A. Bjørnstad (1748), II + III.
On Commelina zambesica C.B. Cl.
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, leg. Gj. (14), II, Busiro Co., Entebbe, 1150 m, leg. Gj. (36), II.

Uredinia with hyaline or yellowish paraphyses, thickened dorsally and at apex. Urediniospores 19-28 x 14-26 µm, ellipsoid or subgloboid, wall ca 1 µm thick, pale yellowish, echinulate.

P. tecta is widespread in Asia, Central- and South America, occurring on several genera belonging to Commelinaceae, but it seems to be rare in Africa. The only record known to me from the continent is one by Angus (1962) who reported the rust on C. ? buchananii C.B. Cl. from Zambia. Both hosts mentioned above are new to this rust.

Puccinia obscura Schroet. in Pass., N. Giorn. Bot. Ital. 9: 256, 1877.
On Luzula abyssinica Parl. (Juncaceae)
Toro Distr., Mt. Ruwenzori Co., between Bujuki Hut and Irene Lake Hut, 4300 m, 1.1.1969, leg. K.A. Lye (1309), II.

Urediniospores 23-27 x (16-)18-24 µm, mostly obovoid, wall 1.5-2 µm thick, cinnamon-brown, echinulate and with 2 superequatorial pores.

This rust species, widespread in Europe and also in Asia and North America on several Luzula spp., has been reported on L. graeca Kunth in Morocco and Algerie where also its aecial stage has been found on Bellis sylvestris Cyr. and Senecio perralderimus Coss. & Dur. It is a new member of the Ugandan rust flora and L. abyssinica is a new host for the rust.

Puccinia phyllocladiae Cke. Grevillea 10: 125, 1882.
On Asparagus falcatus L. (Liliaceae)
Ankole Distr., Co., Ruizi Valley, 1440 m, 9.2.1951, leg. T. Jarrett (Ug/MB/460), III.

Two-celled teliospores 54-59 x 47-52 µm, broadly ellipsoid, one-celled spores 49-52 x 44-47 µm, subgloboid. Wall pale 3-4(-5) µm thick, sometimes slightly thickened at apex, smooth. Pedicel more than 110 µm long, hyaline, thinwalled, collapsing, often attached obliquely to the lower cell.

P. phyllocladiae is a new rust species in Uganda. On A. falcatus it has previously been reported from South Africa and Sri Lanka. Other African hosts are A. sarmentosus L. in S. Africa and Asparagus sp. in Kenya. This rust is reported on Asparagus spp. in India and Pakistan.

Puccinia smilacis-kraussianae Yen. Rev. Mycol. 36: 109, 1971.
On Smilax kraussiana Meisn. (Liliaceae)
Masaka Distr., Buddu Co., Nabugabo, 1000 m, no date, Lind. III. W. Mengo distr., Busiro Co., W. Kisubi Bay, 1100 m, no date, M.E.S. Morrison. 0+I.

Pycnia amphigenous (type 4), surrounded by hemisphaerical aecia, covered by epidermis. The peridia have an opening at the top through which the irregularly and ellipsoid, laminate spores escape. Spores 25-41 x (16-)23-30 µm. Wall unevenly thick, apically up to 11 µm, pale yellow to pale brown, coarsely and sparsely echinulate, but with smooth spots and with 2-4 more or less distinct pores. Uredinia not seen. Telia hypophyllous, scattered, compact, surrounded by epidermis, brown. Teliospores ellipsoid, slightly constricted at septum, 50-64 x 17-23 µm. Wall 2-2.5 µm thick, at apex thickened to 8 µm. Pedicel nearly hyalin, thickwalled, perisitent, length exceeding 100 µm.

Two rust species are described on Smilax kraussiana viz. Puccinia kraussiana Cke. and P. smilacis-kraussianae, the former an eu- form, the latter an opsis- or demicyclic form, lacking the uredinia. However, what Yen has named uredinia, I have named aecia as pycnia are supposed to preceed either aecia or telia, and not uredinia. The peridia are not protruding the epidermis, but except for the small opening at the top, covered by it. The aecial cavities are filed with spores, developed from the base of the aecia.

Uredo kabanyoloensis n. sp. (Fig. 1).

Uredinia pedicellata perdurante epidermidi obtecta, ovalia, pallide cinnamomea. Urediniosporae 20-31 x 15-18 um obovoideae vel ellipsoideae, parietibus 1-1.5 um crassis, cinnamomeis, dense echinulatis, 3-4 poris equatorialibus instructis, papillis demissis hyalinis obsitus.

Holotype: A. Beisland (MHU) Uganda, W. Mengo Distr., Kabanyolo, 1200 m, 13.11.1970, on *Asparagus officinalis* L. (cult.) (Liliaceae). Isotype in NPPI.

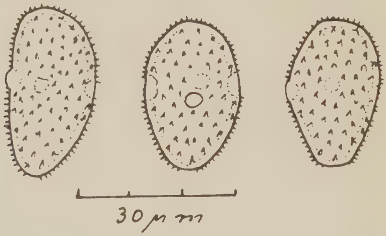

Fig. 1. *Uredo kabanyoloensis*, urediniospores from type.

The urediniospores of this new species differ from those of *Puccinia asparagi* DC. being more narrow, having a thinner wall which is not so pigmented, and not so densely echinulate. It has also a thinner urediniospore wall than has *Puccinia asparagi-lucidi* Diet.

Uredo xyridis E.B. Mains. Contrib. Univ. Michigan Herb. 1: 17, 1939.
On *Xyris angularis* N.E. Br. (Xyridaceae)
Masaka Distr., Bukoto Co., Makonzi - Kasala in Jubiya Forest, 1140 m, 12.8.1971, K.A. Lye & A.B. Katende, II.

Uredinia hypophyllous, subepidermal, long covered by epidermis. Urediniospores raising from a stroma, subgloboid or abovoid, 27-33 x 20-27 um. Wall 1.5 um thick, hyalin, echinulate and with several scattered pores.

The only record of this rust is from Vaquero in Belize. The urediniospores in the African specimen match well with those from the type specimen (IMI 67641).

Uromyces commelinae Cke. Trans. Roy. Soc. Edinb. p. 342, 1887.
On *Aneilema spekei* C.B. Cl. (Commelinaceae)
Masaka Distr., Buddu Co, Kasokero, Lake Victoria, 1140 m, 12.5.1969, leg. K.A. Lye (2925), R.N. Lester & M. Morrison, II.

On Commelina benghalensis L. (Commelinaceae)
W. Mengo Distr., Busiro Co., Entebbe, 1150 m, leg. Gj. (31) II.
On Commelina congesta C.B. Cl.
Ankole Distr., Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (139), II.
On Commelina erecta L.
Kenya. Eastern Prov., Nyeri Distr., Mt. Kenya S slope, Regati Forest Station, 2200-2300 m, 2-3.2.1973, leg. L. Ryvarden (9116), II.
On Commelina reptans Brenan
Distr. Ankole, Co., Ruizi River, c. 1350 m, leg. T. Jarrett (MB/501), II.
On Commelina zambesica C.B. Cl.
W. Mengo Distr., Busiro Co., Kisibawo, 1200 m, leg. Gj., (188), II; Tororo Distr., W. Bugama Co., on the Jinja-Tororo road, 17 km W of Tororo, 1200 m, leg. Gj. (422), II.
On Cyanotis aff. foecunda Hassk. (Commelinaceae)
W. Mengo Distr., Kyadondo Co., Kazi, 1160 m, 7.9.1970, leg. Gj. (64), II.
On Cyanotis longifolia Benth.
Mubende Distr., Singo Co., Hoima Road, Mile 112 from Kampala, 1400 m, leg. Gj. (322) II; Bunyoro Distr., Bujenje Co., Bukumi Escarpment, 1000 m, leg. Gj. (346) (II+) III.
On Murdannia simplex (Vahl) Brenan (Commelinaceae)
W. Mengo Distr., Kyadondo Co., Kazi, 1160 m, leg. Gj. (52), II, Busiro Co., Zika Forest, 1160 m, leg. Gj. (73), II.

Urediniospores 20-40 x 18-35 µm, obovoid, ellipsoid to globoid, wall 1.5-2.5(-3) µm thick, pale cinnamon-brown to cinnamon-brown, echinulate and with two mostly conspicus, equatorial pores covered by low, hyaline papillae. Telio-spores 20-35 x 21-27 µm, ellipsoid, attenuate at apex, wall at side 2-2.5 µm thick, at apex thickened up to 16 µm, cinnamon-brown, smooth. Pedicel hyaline, collapsing, up to 50 µm long, but often broken shorter.

U. commelinae is widespread in Africa, and also in warmer regions of Asia, Australia and America, and it is recorded on several genera belonging to Commelinaceae. Wakefield & Hansford (1949) who reported it on Commelina spp., said that the rust is common everywhere in Uganda. Aneilema, Cyanotis and Murdannia are new genera for the rust in Uganda, and Commelina congesta, C. reptans and C. zambesica and the two Cyanotis species are new host species for the rust. On Aneilema spekei and Murdannia simplex it is reported from Malawi and India, respectively. Commelina erecta is reported as a host in U.S.A., while C. benghalensis has been reported from several African countries.

In India Patil & Thirumalachar (1968) showed that U. commelinae produces pycnia and aecia on Cissus and Vitis, but there seems to be specialized forms.

Aecidia on *Cissus* and *Vitis* are described under several names. From Uganda Wakefield & Hansford (op.cit.) reported *Aecidium vitis* Smith on *Cissus* sp. Patil & Thirumalachar (op.cit.) stated that this aecial stage (*A. vitis*) it "not very distinct from *A. mexicanum*" Diet. & Holw. Cummins (1963) reported on uredinia on *Commelina elegans* H.B.K. after inoculation experiments carried out by E.C. Heinrich with aeciospores of *A. mexicanum* on *Cissus*. To my knowledge such experiments have not been carried out in Africa.

Uromyces dipcadi n.sp. (Fig. 2).
Pycnia, aecia et uredinea non visa. Telia amphigena, dense aggregata, epidermidi diu obtecta, demum nuda, pulverulenta, cinnamomea. Teliosporae irregulariter angulatae vel ellipsoideae, ovoideae vel obovoideae, 23-34 x 19-30 µm, parietibus in eadem spora irregulariter crassis (1.5-) 2-4 µm, laevis, brunneis, pedicello usque ad 20 µm longo, hyalino, persistenti.

Holotype: M. Thulin 2689 (UPS), 9.-10.5.1978, Kenya, Mandera Distr., 48 km on the Ramu - El Wak road, 650-900 m on *Dipcadi viride* (L.) Moenck (Liliaceae). Isotype in NPPI.

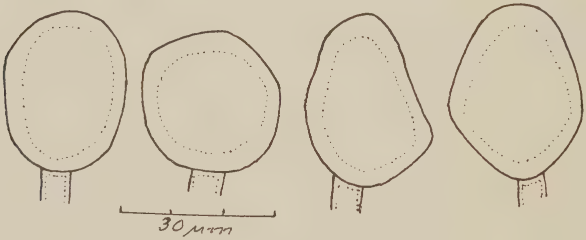

Fig. 2. *Uromyces dipcadi*, teliospores from type.

U. dipcadi differs from *U. maireanus* P. & H. Syd. in having wider teliospores with thicker walls which thickness also varies in the same spore. *U. maireanus* has a full life cycle, while in *U. dipcadi* only telia are known. *U. dipcadi* also differs from *U. muscari* (Duby) Lév. (syn. *U. scillarum* (Grev.) Lév.) reported on *Dipcadi*, in having thinner teliospore walls. However, teliospores of *U. maireanus* and *U. muscari* are very similar and may have been confused if only telia are present (cf. Jørstad 1958).

Doidge (1948) described *Aecidium dipcadi-viridi* on *Dipcadi* from S. Africa.

In some leaves the fungus forms several long patches with telia indicating a systemic habit.

Uromyces eulophiae n.sp. (Fig. 3)

Pycnia non visa. Aecia amphigena, dispersa vel laxe aggregata. Aeciosporae 15-24 x 11-19 µm, irregulariter angulatae, ellipsoideae, parietibus ca 1 µm crassis, ad apicem usque ad 4.5 µm incrassatis, hyalinis, dense verrucosis. Uredinia non visa. Telia irregulariter rotundata, usque ad 2 mm diam., epidermidi obtecta, compacta, atrobrunnea. Teliosporae 31-38 x 23-27 µm late ellipsoideae vel obovoideae, apice rotundatae, parietibus 1.5-2 µm crassis, laevis, ad apicem usque ad 13 µm incrassatis, cinnamomeis, apice extus pallidior, pedicello prope sporam pallide brunneo, aliter hyalino.

Holotype: K.A. Lye 2286 (MHU), 5.3.1969, Uganda, Kigezi Distr., Bufumbira Co., Cyanika, on Ruanda Border, 2000 m on *Eulophia paivaeana* (Reichb. f.) Summerh. ssp. *borealis* Summerh. (Orchidaceae). Isotype in NPPI.

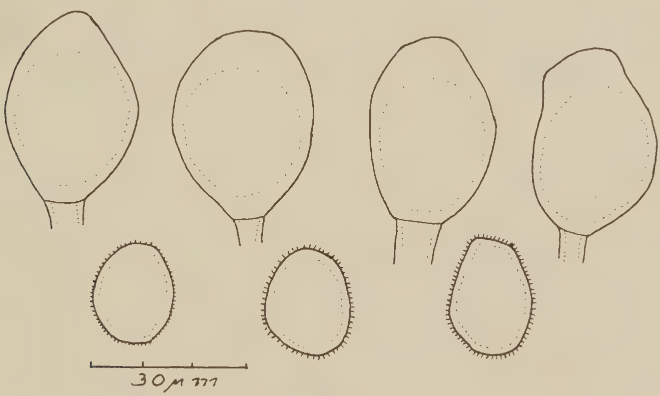

Fig. 3. *Uromyces eulophiae*, teliospores and aeciospores from type.

The only rust species known on *Eulophia* is *Puccinia humationis* Cumm., described on *E. squalida* Lindl. from the Philippines.

Uromyces transversalis Wint. Flora 42: 263, 1884.

Syn. *Uredo transversalis* Thuem. Flora: 570, 1876.

On *Gladiolus* c.v. 'Carmen' (Iridaceae)

W. Mengo Distr., Kyadondo Co., Kabanyolo, 1200 m, 12.5.1972,leg. O.M. Heide, II.

On *Gladiolus psittacinus* Hook.

W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 27.7.1971, leg. O.M. Heide, II, Kabanyolo 1200 m, 11.1959, leg. F. Katete, II; Bugizu Distr., N. Bugisu Co., Mt.

Elgon, near Sasa River on the track to Sasa Hut, 2800 m, leg. Gj. (364), II + III.

Urediniospores 16-25 x 14-21 µm, ovoid, ellipsoid to subgloboid, wall 1.5 µm thick, hyaline, echinulate with scattered pores. Telia loculate by brown paraphyses, irregularly angular, obovoid, ellipsoid, wall 1-1.5 µm thick, at apex thickened up to 5 µm, pale brown, smooth. Pedicel hyaline, collapsing.

This rust, reported on Gladiolus sp. from Mt. Elgon by Wakefield & Hansford (1949), is widespread in Africa not only on Gladiolus, but also on several other genera belonging to Iridaceae. On cuttings and cut flowers it has been found in Europe. G. psittacinus has been recorded as a host in Kenya and South Africa.

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NEW SPECIES OF XANTHOPARMELIA (VAIN.) HALE (ASCOMYCOTINA: PARMELIACEAE)

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Abstract.--Eight new species of Xanthoparmelia are described: X. californica, X. isidiascens, X. kalbii, X. montanensis, X. neocongruens, X. neotaractica, X. schmidtii, and X. subpigmentosa. New combinations in the genus are proposed for Parmelia barbellata Kurok., P. exuviata Kurok., P. globulifera Kurok. & Filson, P. luminosa Elix, P. metastrigosa Elix, P. multipartita (R. Br.) Elix, P. refringens Kurok. & Filson, P. subcrustacea Gyel., and P. sulcifera Kurok.

Xanthoparmelia californica Hale, sp. nov. Fig. 1

Thallus affinis X. lineolae (Berry) Hale sed acidum norsticticum continente differens.

Thallus closely adnate on rock, yellowish green, 4-6 cm broad; lobes short and irregularly branched, crowded, 1-2 mm wide; upper surface plane, shiny, emaculate, lacking isidia; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia numerous, 90-110 µm in diameter; microconidia cylindrical, 4-5 µm long. Apothecia adnate, 1.5-2.0 mm in diameter; hymenium 45 µm high; spores simple, colorless, 4-5 X 8-9 µm.

Chemistry: Usnic, norstictic and connorstictic acids.

Type: Entrance to Folsom Prison, Folsom, Sacramento County, California, elev. 100 m, Elmer A. Schmidt 464, 22 March 1980 (US, holotype).

Specimens examined. CALIFORNIA: Figueroa Mountain, Santa Barbara County, Cole 1547 (US). ARIZONA: Douglas Spring, Pima County, McCune 10243 (US). TEXAS: Llano, Llano County, Fisher 42232 (US).

This rare species would be identified as a small X. lineola without a chemical test (X. lineola contains salazinic acid). There is only one other Xanthoparmelia in North America with norstictic acid, X. dierythra (Hale) Hale, distinguised by broader lobes, a very pale lower surface, and isidia. It is probably unrelated.

Xanthoparmelia isidiascens Hale, sp. nov. Fig. 2

Thallus affinis X. conspersae (Ach.) Hale sed lobis linearibus, laxe adnatis differens.

Thallus loosely attached on rock, yellowish green, 6-13 cm broad; lobes sublinear, 2-5 mm wide; upper surface plane, continuous, emaculate, sparsely to moderately isidiate, the isidia short branched with age, 0.08-

0.1 mm in diameter, to 1.0 mm high; lower surface black, except brown in a marginal rim, sparsely to moderately rhizinate, the rhizines black.

Pycnidia numerous, 100-120 µm in diameter; microconidia cylindrical to weakly bifusiform, 5-6 µm long. Apothecia common, adnate, 3-6 mm in diameter; hymenium 55-60 µm high; spores simple, colorless, 5-6 X 7-9 µm.

Chemistry: Usnic, stictic, constictic, and norstictic acids.

Type: West side of Tallapoosa River, near Blake's Ferry, Randolph County, Alabama, R. McVaugh 4588 (US, holotype).

Specimens examined. MARYLAND: Baltimore County, Plitt H.R.1 (US). VIRGINIA: Albemarle County, Luttrell & Goldstein 3162 (US); Chesterfield County, Luttrell 1502, 1548 (US); Henrico County, Luttrell 99 (US). NORTH CAROLINA: Alexander County, Keever 420 (US). TENNESSEE: Roane County, Spector TL-731 (US). GEORGIA: Columbia County, McVaugh 4661 (US); Greene County, McVaugh 4670, Pyron & McVaugh s.n. (US); Hancock County, McVaugh 4690 (US); Heard County, McVaugh 4606 (US); Oglethorpe County, McVaugh 4600, Pyron & McVaugh s.n. (US); Putnam County, McVaugh 4680 (US); Walton County, McVaugh 2038 (US). ARKANSAS: Searcy County, Emig 2066 (US). INDIANA: Crawford County, Deam 51607 (US). MISSOURI: Franklin County, Berry 649 (US); Iron County, Hubricht B2296 (US); Montgomery County, Darker 7471 (US).

This species is widespread and apparently confined on open sandstone and granite outcrops in southeastern U.S.A. It differs from X. conspersa in overall growth form, being larger and more loosely adnate with long linear lobes. On the world level there are no comparable species with stictic acid.

Xanthoparmelia kalbii Hale, sp. nov. Fig. 3

Thallus ut in X. plittii (Gyel.) Hale sed isidiis globosis et acidum hyposticticum atque hyposalazinicum continente differens.

Thallus closely adnate on rock, bright yellow green, 3-4 cm broad; lobes sublinear but crowded and contiguous, 1.5-2.0 mm wide; upper surface plane, transversely cracked with age, emaculate, sparsely to moderately isidiate, the isidia basally constricted, somewhat inflated, eroding and subsorediate apically with age, 0.08-0.2 mm in diameter, up to 0.5 mm high; lower surface pale brown, moderately rhizinate, the rhizines pale brown.

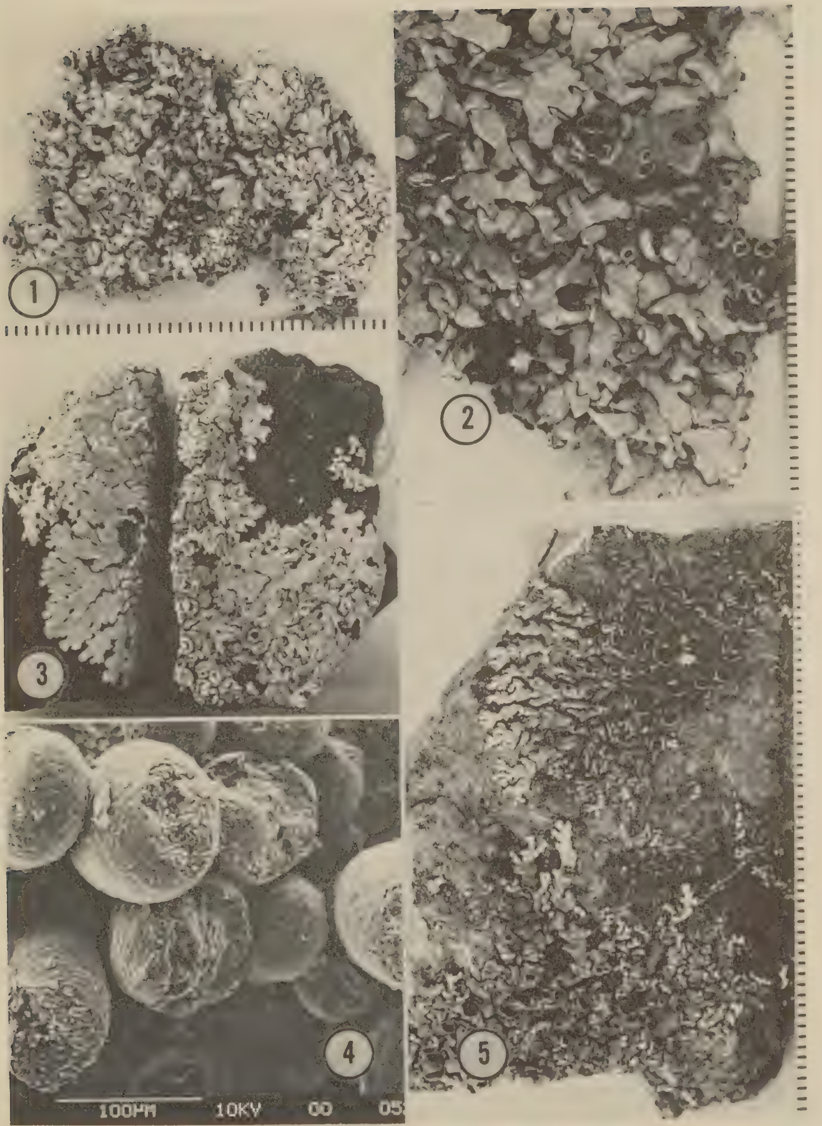
Pycnidia numerous, 100-110 µm in diameter; microconidia cylindrical to weakly bifusiform, 5-6 µm long. Apothecia numerous, adnate, 1-1.3 mm in diameter; hymenium 50-55 µm high; spores simple, colorless, 6 X 10-11 µm.

Chemistry: Usnic, hypostictic and hyposalazinic acids with an additional "quintaria" substance.

Type: Catimbal-Pe, Pernambuco, Brazil, Lauro Xavier 754 (US, holotype).

Specimens examined. BRAZIL: 10 km vor Milagres, Bahia, K. Kalb 296, 21.7.1980 (Herb. Kalb, US).

Globose isidia are rare in Xanthoparmelia. In X. kalbii they are rather delicate and some burst open (Fig. 4). Similar isidia are known in several Australian species, X. exuviata (Kurok.) Hale*, X. globulifera (Kurok. & Fils.) Hale*, and X. refringens (Kurok.) Hale* [formal new combinations for these and other species mentioned below with asterisks will be given at the end of this paper]. An equally unusual character is the "quintaria" chemistry, previously unknown in South America, and as a matter of fact X. kalbii is the only known isidiate Xanthoparmelia with this chemistry. All others (X. metastrigosa (Elix) Hale,* X. multipartita (R. Br.) Hale,* X. quintaria (Hale) Hale, X. subcrustacea (Gyel.) Hale,* and X. sulcifera (Kurok.) Hale*) are nonisidiate. The species is named in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Figs. 1-5. Type specimens of *Xanthoparmelia*. 1, *X. californica*; 2, *X. isidiascens*; 3, *X. kalbii*; 4, isidia of *X. kalbii* (SEM); 5, *X. montanensis* (all holotypes in US) (scale in mm).

honor of Dr. Klaus Kalb, the first professional lichenologist to collect extensively in Brazil since G. A. Malme in the 1890's.

Xanthoparmelia montanensis Hale, sp. nov. Fig. 5

Differt ab X. lineola (Berry) Hale acidum lichesterinicum continente.

Thallus closely adnate on rock, dull yellowish green, 3-6 cm broad; lobes short and irregularly branched, crowded, 1-1.5 mm wide; upper surface dull to shiny, plane to minutely rugulose, emaculate, becoming short laciniate at the center with age; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia rare, microconidia not found. Apothecia numerous, adnate, the disc plane, dark brown, 1-3 mm in diameter; hymenium 45-50 µm high; spores simple, colorless, 5-6 X 9-11 µm.

Chemistry: Usnic and a fatty acid near lichesterinic acid.

Type: Near Kootenai Falls, 6 mi E of Troy, Lincoln County, Montana, B. McCune 8863, 9-5-1977 (US, holotype).

Specimens examined. MONTANA: Lincoln County, McCune 7833 (US). CALIFORNIA: Plumas County, Hale 57615 (US); Tulare County, Hale 57075 (US). UTAH: Beaver County, Hale 51288, 51310 (US). ARIZONA: Coconino County, Hale 33585, 33589 (US).

This western U. S. species is superficially close to X. lineola but with somewhat more linear, closely adnate lobes. The chemistry is unique, for no other species in the genus contain lichesterinic acid. Almost all other fatty acid-containing Xanthoparmelias, including X. subdecipiens (Vainio) Hale in North America, contain constipatic acid or derivatives. I am grateful to Dr. Chicita Culberson for identification of the chemistry.

Xanthoparmelia neocongruens Hale, sp. nov. Fig. 6

Thallus subaffinis X. molliusculae (Ach.) Hale sed isidiis nullis et acidum hypoprotocetraricum continente differt.

Thallus loosely adnate on soil, bright yellowish green, leathery, 4 cm broad; lobes sublinear, irregularly branched and weakly convoluted, 2-5 mm wide; upper surface dull, plane to rather rugulose with age, emaculate, isidia lacking; lower surface light brown, moderately rhizinate, the rhizines pale brown.

Pycnidia numerous, about 100 µm in diameter; microconidia 4-5 µm long, bifusiform. Apothecia imperfectly developed; spores not seen.

Chemistry: Usnic, hypoprotocetraric and 4-O-methylnotatic acids.

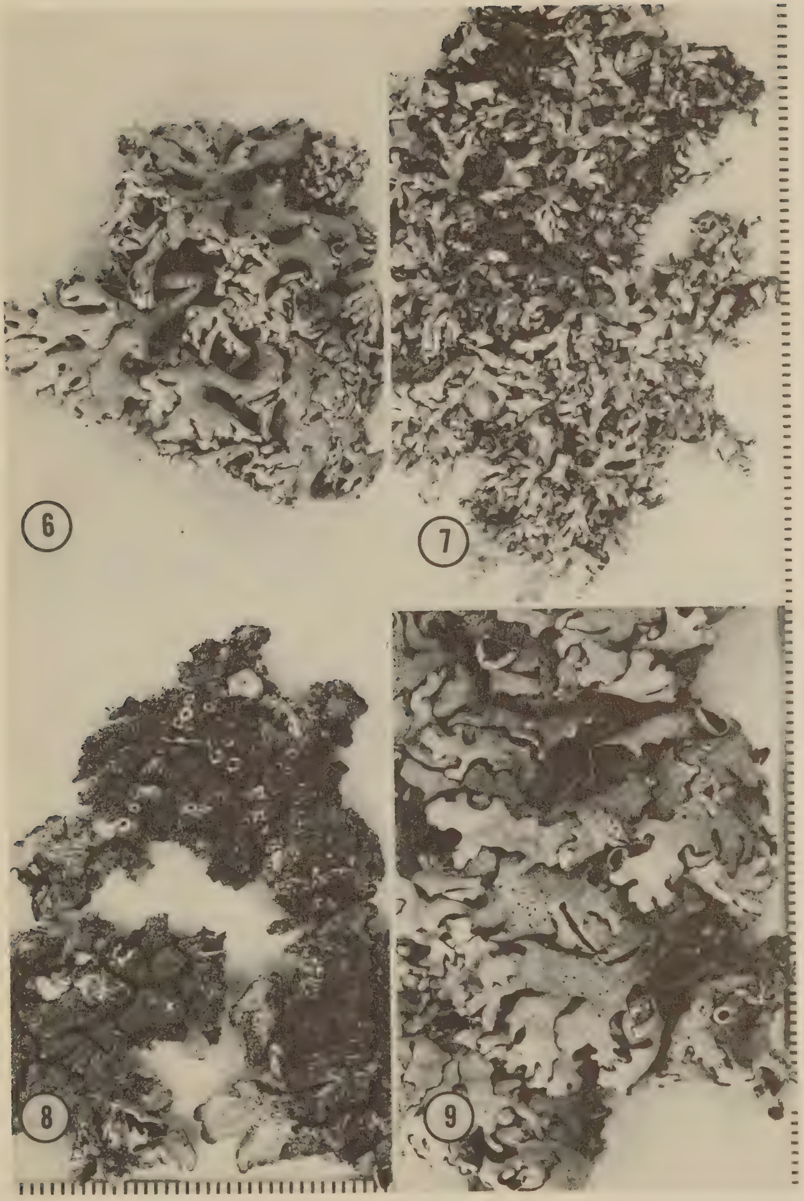
Type: Bowe's Dorp, near Kamieskroon, Namaqualand, Republic of South Africa, T. P. Stokoe 7719, September 1941 (BOL, holotype; US, isotype).

While known only from a single collection, X. neocongruens is well distinguished by the combination of chemistry and morphology. No other species with hypoprotocetraric acid are loosely adnate and grow on soil. An apparent isotype of Parmelia congruens Ach. in UPS, which lacks any specific label data, is this same species. However, the protologue of P. congruens mentions a corticolous lichen from Pennsylvania, the identity of which is still unknown today. Nylander (Syn. Lich. p. 392, 1860) also examined "type material" which he recognized as close to Parmelia conspersa, "laciniis saepius convexiusculis differens."

Xanthoparmelia neotaractica Hale, sp. nov. Fig. 7

Thallus affinis X. taracticae (Kremplh.) Hale sed differens acidum sticticum continente.

Thallus loosely attached on rock, yellowish green, 5-8 cm broad;



Figs. 6-9. Type specimens of Xanthoparmelia. 6, X. neocongruens (isotype in US); 7, X. neotaractica (US); 8, X. schmidtii (US); 9, X. subpigmentosa (isotype in US) (scale in mm).

lobes sublinear and divaricate-branched, 1-2 mm wide; upper surface plane, continuous, emaculate, isidia lacking; lower surface pale or darker brown, sparsely to moderately rhizinate, the rhizines brown.

Pycnidia numerous, 120-150 µm in diameter; microconidia cylindrical, 5-6 µm long. Apothecia rare, about 3 mm in diameter; hymenium 45-50 µm high; spores simple, colorless, 5-6 X 8-9 µm.

Chemistry: Usnic, stictic, constictic and norstictic acids.

Type: Albert Pike Recreation Area, Montgomery County, Arkansas, M.E. Hale 3911, July 1954 (US, holotype).

Specimens examined. ARKANSAS: Franklin County, Hale 3643 (US); Yell County, Hale 3198 (US). OKLAHOMA: McCurtain County, Hale 4920 (US); Pottawatomie County, Hale 4834 (US).

This species is externally similar to the well-known X. taractica ("Parmelia stenophylla") but lacks any trace of maculae on the lobe surfaces and contains the stictic acid series rather than salazinic acid.

Xanthoparmelia schmidtii Hale, sp. nov. Fig. 8

Thallus ut in X. mexicana (Gyel.) Hale sed acidum barbaticum, acidum norsticticum atque acidum salazinicum continente differt.

Thallus closely adnate to adnate on rock, dull yellowish green, 4-8 cm broad; lobes short and irregularly branched, apically rotund, 3-5 mm wide; upper surface plane, continuous, emaculate, becoming densely isidiate, the isidia cylindrical to somewhat barrel shaped, densely branched with age and tipped with brown, 0.15-0.3 mm in diameter, to 1.0 mm high; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia not found. Apothecia rare, adnate to substipitate, 2-3 mm in diameter; hymenium 45 µm high; spores simple, colorless, 4-6 X 9-10 µm.

Chemistry: Usnic, barbatic, 4-O-demethylbarbatic, salazinic and norstictic acids.

Type: On M-296, about 4 mi W of junction M-296 and J-37, on road to Visalia, Tulare County, California, M. E. Hale 57087 (US, holotype).

Specimens examined. CALIFORNIA: Tulare County, Hale 56347, 56355, 56499, 56671, 56675, 56679, 56683, 57078, Schmidt 1120 (US).

This lichen was first identified as X. mexicana, a common Xanthoparmelia in California. The chemistry, however, represents a most remarkable combination of several acids in nearly equal concentration. Barbatic acid is known in North America only in rare X. barbatica (Elix) Egan and X. moctezumensis Nash, but never on the world level with norstictic or salazinic acids. The species is known so far only in Tulare County California, in the foothills of the Sierra Nevada at 400-800 m elevation. In this same area X. mexicana occurs mostly at 1500 m or higher. The species is named for Mr. Elmer Schmidt, an avid lichen collector who first discovered it. The chemistry was verified by Dr. J. A. Elix.

Xanthoparmelia subpigmentosa Hale, sp. nov. Fig. 9

Thallus ut in X. luminosa (Elix) Hale* sed subtus colore pallide brunneo differens.

Thallus loosely adnate on rocks, somewhat pulvinate, leathery, bright yellow green, 8-12 cm broad; lobes linear-elongate, 3-5 mm broad, becoming black-rimmed with age; upper surface plane, dull, emaculate, isidia lacking; lower surface light brown with a dull reddish orange tinge or darkening, sparsely to moderately rhizinate, the rhizines coarse, light brown.

Pycnidia common, 100-110 µm in diameter; microconidia 5-6 µm long, bifusiform. Apothecia common, adnate, 3-5 mm in diameter; hymenium 45-50 µm high; spores simple, colorless, 5-6 X 9-10 µm.

Chemistry: Usnic, salazinic acids; skyrin in the lower cortical area.

Type: Mountain Road near Blue Mountain Pass, above St. Philomena School, Div. Maseru, Basutoland, South Africa, L. Kofler 3669, 6.6.1963 (LD, holotype; US, isotype).

Specimens examined. REPUBLIC OF SOUTH AFRICA: Basutoland, *Hewitt* s.n., *Kofler* 82 63 1, s.n. (2 specimens) (LD, US); Cape Province, *Höeg* s.n. (LD, US); Orange Free State, *Maas Geesteranus* 6523a, 6523b (LD, US); Natal, *Höeg* s.n. (TRS, US).

I had earlier identified all of the specimens listed above as *X. taractica*. A reexamination of this difficult species complex showed that the South African material has a darker brown, often dull orange-tinted lower surface, the pigmentation being caused by skyrin in a thin layer of medulla just above the lower cortex. It is also different in texture, quite leathery and stiff. In these respects it is actually quite close to the Australian *X. luminosa*, which has a jet black lower surface. Skyrin is also known in *X. barbellata* (Kurok.) Hale* and *X. fucina* Knox.

The following new combinations are formally proposed in this paper:

Xanthoparmelia barbellata (Kurok.) Hale, comb. nov.
  Basionym: *Parmelia barbellata* Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:35. 1982.
Xanthoparmelia exuviata (Kurok.) Hale, comb. nov.
  Basionym: *Parmelia exuviata* Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:36. 1982.
Xanthoparmelia globulifera (Kurok. & Filson) Hale, comb. nov.
  Basionym: *Parmelia globulifera* Kurok. & Filson, Bull. Nat. Sci. Mus. (Tokyo), ser. B, 1:38. 1975.
Xanthoparmelia luminosa (Elix) Hale, comb. nov.
  Basionym: *Parmelia luminosa* Elix, Austr. Journ. Bot. 29:357. 1981.
Xanthoparmelia metastrigosa (Elix) Hale, comb. nov.
  Basionym: *Parmelia metastrigosa* Elix, Austr. Journ. Bot. 29:360. 1981.
Xanthoparmelia multipartita (R. Br.) Hale, comb. nov.
  Basionym: *Parmelia conspersa* var. *multipartita* R. Br. ex Crombie, Journ. Linn. Soc. London Bot. 17:394. 1880.
Xanthoparmelia refringens (Kurok. & Filson) Hale, comb. nov.
  Basionym: *Parmelia refringens* Kurok. & Filson, Bull. Nat. Sci. Mus. (Tokyo), ser. B, 1:43. 1975.
Xanthoparmelia subcrustacea (Gyel.) Hale, comb. nov.
  Basionym: *Parmelia subcrustacea* Gyel., Ann. Mus. Nat. Hung. 29:30.1935.
Xanthoparmelia sulcifera (Kurok.) Hale, comb. nov.
  Basionym: *Parmelia sulcifera* Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:37. 1981.

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A NEW SPECIES OF TRICHIA (MYXOMYCETES) FROM NORWAY

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SUMMARY

Trichia sordida sp. nov. is described from Norway. The species seems related to *T. botrytis* (J.F. Gmel.) Pers. and *T. contorta* (Ditmar) Rost. It differs from both in having large, ochraceous, crowded sporangia and larger spores. Furthermore, it differs from *T. botrytis* in its sessile habit and from *T. contorta* in having elaters with long, slender tips.

TRICHIA SORDIDA Johannesen sp. nov.

Fructificatio sporangia, aggregata, sessilia, globosa vel leviter elongata, (0.5-)1-1.5(-2.5) mm diam. Peridium simplex, plusminusque translucens, partim densatum cum rudi materia granulas complectenti, densationes videntur ut fuscae lineae vel panni in facie peridii, luce reflecta ochraceo-fulvum, luce transmissa pallide flavum, dehiscentia irregularis. Hypothallus conspicuus, rubro-brunneus vel memnonius. Capillitium abundans, per saturam aurantiacum, luce transmissa luteum, e elateribus 4-5 um diam. cum 4-6 spiris laevibus et apicibus longe protractis constans, interdum cum subapicalibus tumoribus. Sporae per saturam luteae, luce transmissa flavae, globosae, (13.5-)14-15(-16.5) um diam., dense et minute verrucosae. Plasmodium ignotum.

Fructification sporangiate. Sporangia closely aggregated in a single plane, rarely somewhat superimposed, sessile, globose or irregular from pressure to slightly elongate, (0.5-)1-1.5(-2.5) mm in diameter. Peridium single, more or less translucent, dull ochraceous in reflected light (44 Ochreous of Rayner 1970), pale yellowish in transmitted light, partly thickened with amorphous matter including granules 1-1.5 um in diameter, the thickenings seen as dark lines and patches on the outer peridial surface, inner surface deli-

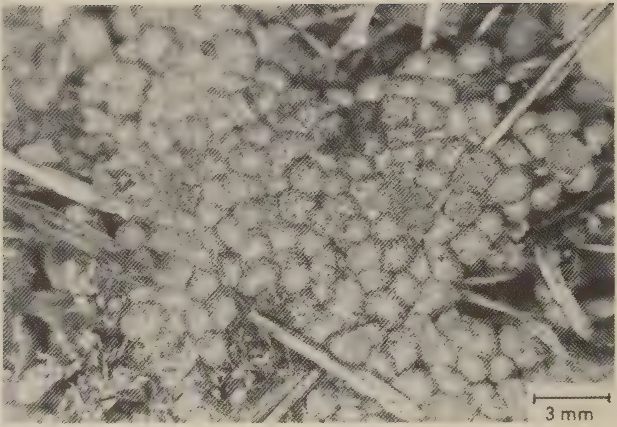

Fig. 1: Trichia sordida Johannesen sp. nov.
Group of sporangia.

cately striated, dehiscence irregular. Hypothallus prominent, cartilaginous, common to a colony, reddish-brown to blackish. Capillitium abundant, orange in mass (between 7 Orange and 8 Sienna of Rayner 1970), bright yellow in transmitted light, consisting of long, free elaters, unbranched or very rarely branched near the apices, bearing 4-6 smooth spiral bands, 4-5 um in diameter, with long, gradually tapering tips, sometimes with subapical swellings up to 10 um or more. Spores bright yellow in mass (between 44 Ochreous and 47 Amber of Rayner 1970), pale yellow with a slight greenish tint in transmitted light, globose or somewhat irregular in shape, (13.5-)14-15(-16.5) um in diameter, densely covered with small, pileate warts. Plasmodium unknown.

Etymology: From the Latin 'sordidus' (dirty-looking), referring to the dark lines and spots on the peridium.

Holotypus: Norway: Akershus: Bærum, near Furuholmen, May 8 1975, Leg. K. Høiland, (O). Isotypi at K and in the private collection of Mrs. N.E. Nannenga-Bremekamp, Doorwerth (sub no. 12 560).

Habitat: Dead grass and litter near melting snow.

Distribution: Known only from the type collection.

Discussion: The species is characterized by its large, crowded, dull ochraceous sporangia with dark lines and spots, its smooth elaters with long. gradually tapering tips, and its large, densely-warted spores.

The sporangia are mostly 1-1.5 mm in diameter, which is larger than in any other species of Trichia. The type of

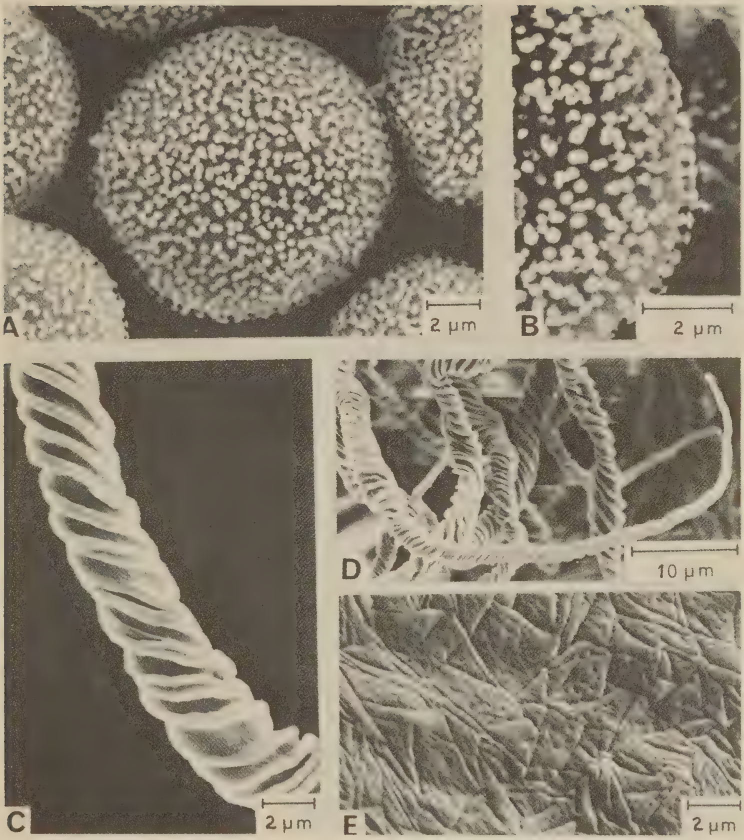

Fig. 2: Trichia sordida Johannesen sp. nov. A, B: Spores. C, D: Elaters. E: Inner peridial surface.

spore ornamentation (Fig. 2 A, B) is what Rammeloo (1974b) termed 'pileate' and is similar to what is found in T. varia (Pers.) Pers. and T. contorta (Ditmar) Rost. Both these species, however, have smaller spores and smaller, more scattered sporangia. Furthermore, T. varia has elaters with only 2-3 spirals and T. contorta more irregular elaters without the long, gradually tapering tips.

The ornamentation on the inner peridial surface (Fig. 2 E) is similar to that seen in T. botrytis (J.F. Gmel.) Pers. (Rammeloo 1974a). The latter, however, has smaller, scattered, and usually stalked sporangia and smaller spores.

The elaters (Fig. 2 C, D) are similar to those of *T. botrytis*, *T. floriformis* (Schw.) G. Lister, and *T. decipiens* (Pers.) Macbr., and also bear resemblance to those of *T. contorta* in being occasionally swollen, especially near the apices, and in being very rarely branched. *T. floriformis*, however, has purplish, stalked sporangia with brick-red spores and capillitium, and *T. decipiens* has stalked sporangia with a shining peridium and subreticulate spores.

The habitat is also somewhat unusual, since the other species of *Trichia* with extensive fructifications of crowded sporangia are mostly confined to dead wood or bark. According to the collector (pers. comm.), the type specimen was collected on the ground, apparently without any connection to dead wood.

Using the key of Martin & Alexopoulos (1969) the specimen would probably be identified as *T. alpina* (R.E. Fries) Meylan due to the sessile sporangia and the large, minutely warted spores. However, *T. alpina* has smaller sporangia (or plasmodiocarps) with a much darker and tougher peridium and elaters 6-8(-10) um wide without the long, gradually tapering tips.

Judging from the spore ornamentation, the ornamentation on the inner peridial surface, and the type of elaters, *T. sordida* seems most closely related to *T. contorta* and *T. botrytis*.

ACKNOWLEDGEMENTS

I am much indebted to Mrs. N.E. Nannenga-Bremekamp, Doorwerth, for helpful advice and comments and to Professor E. Kraggerud, Oslo, for correcting the Latin description. The Electron Microscopical Unit for Biological Sciences, University of Oslo, is thanked for their kind help in preparing the scanning electron micrographs.

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MYCOTAXON

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TWO NEW BASIDIOMYCETES ON LIVING LIVE OAK[1] IN THE SOUTHEAST AND GULF COAST REGION

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SUMMARY

Two new species of Aphyllophorales, *Perenniporia phloiophila* (Polyporaceae) and *Hyphoderma baculorubrense* (Corticiaceae), are described and illustrated. They fruit on bark of living live oak and are apparently restricted to that host.

Observations of live oak (*Quercus virginiana* Mill.) on the campus of Louisiana State University and elsewhere in the southeastern United States and Texas have indicated that certain wood-rotting basidiomycetes are consistently associated with that host species. Two of these fruit abundantly on bark of live trunks and branches of older trees and apparently utilize bark tissue as a nutrient source. One is a species of the genus *Perenniporia* Murr. of the family Polyporaceae, and the other is a species of the genus *Hyphoderma* Wallr. of the Corticiaceae (Figs. 1 and 2). Morphological studies of these two fungi and interfertility tests with similar species indicate that they are distinct and genetically isolated species. They are here described as new.

PERENNIPORIA PHLOIOPHILA Gilbn. et M. Blackwell, sp. nov.

Fructificatio resupinata vel leviter reflexa, perennia, in corticem quercuum vivum, cremea vel pallido-bubalina; pori 3-5 per mm; systema hypharum trimiticum; hyphae generatoriae fibulatae; hyphae skeletales dextrinoideae; cystidiola 16-20 x 6-8 µm, fusoidea; basidia 16-28 x 8.5-11 µm, late clavata; basidiosporae 7.5-11 x 6-8 µm, ellipsoideae, hyalinae, truncatae, crassitunicatae, dextrinoideae. Typus: on *Quercus virginiana* Mill., Louisiana State Univ., Baton Rouge, East Baton Rouge Parish, LA, R. L. Gilbertson 13308, Aug. 27, 1981 (BPI).

Basidiocarps resupinate to slightly reflexed, perennial, developing as small single units 0.7-6 cm wide or becoming confluent and up to 1

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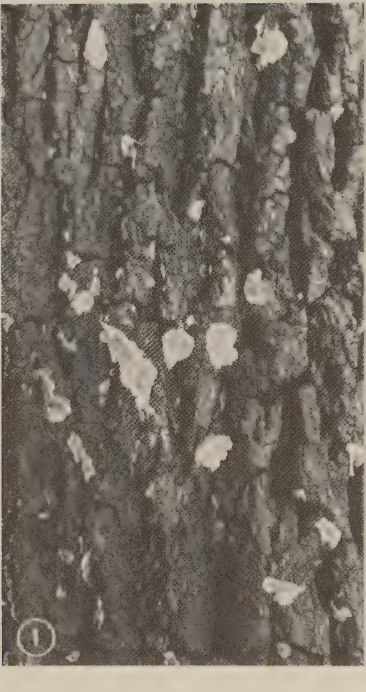
[1] University of Arizona Agricultural Experiment Station Journal Article No. 3846.



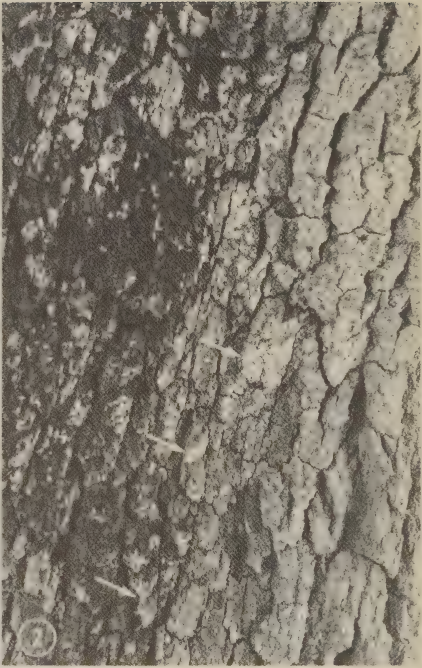


Fig. 1. Basidiocarps of *Perenniporia phloiophila* on bark of living live oak on LSU campus (x 0.4). Fig. 2. Basidiocarps (arrows) of *Hyphoderma baculorubrubrense* on bark of living live oak on LSU campus. Note darker, smoother exfoliated bark (x 0.5).

meter in largest dimension, conforming to the topography of the bark; pore surface cream-colored to pale buff, the pores circular to angular, 3-5 per mm; dissepiments thick, entire; context white to cream colored, less than 1 mm thick; tube layer indistinctly stratified, up to 2 mm thick, older layers often stuffed with white mycelium.

Hyphal system trimitic; generative hyphae (Fig. 3a) 2-4 µm in diam, inconspicuous and difficult to discern, thin-walled, with clamps; binding hyphae (Fig. 3b) 2-4 µm in diam, thick-walled, nonseptate, with frequent branching, negative in Melzer's reagent; skeletal hyphae (Fig. 3c) mostly 2.5-5.5 µm in diam but some slender skeletals 1-2 µm in diam also present, thick-walled, with occasional branching, nonseptate, dextrinoid in Melzer's reagent; cystidioles (Fig. 3e) 16-20 x 6-8 µm, fusoid, thin-walled, not projecting; basidia (Fig. 3d) 16-28 x 8.5-11 µm, broadly clavate, 4-sterigmate, with a basal clamp; basidiospores (Fig. 3f) 7.5-11 x 6-8 µm, ellipsoid, smooth, thick-walled, with a thin-walled truncate apex, hyaline in KOH, dextrinoid in Melzer's reagent.

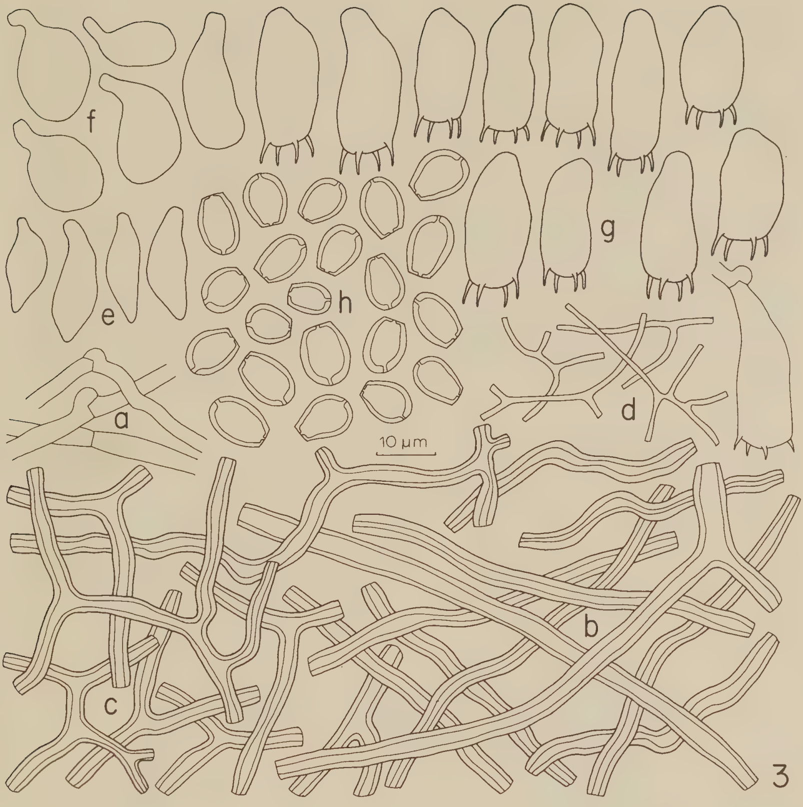


Fig. 3. Microscopic characters of *Perenniporia phloiophila*. a, generative hyphae; b, skeletal hyphae; c, binding hyphae; d, slender binding hyphae; e, fusoid cystidioles; f, immature basidia; g, mature basidia; h, basidiospores.

ADDITIONAL SPECIMENS EXAMINED (all on living live oak): FLORIDA: H.H. Burdsall No. 10013, Tall Timbers, Leon County, Aug. 17, 1977. LOUISIANA: Meredith Blackwell (MB) 928 and 929, LSU, Alexandria, Rapides Parish, Sept. 28, 1982; R.L. Gilbertson (RLG) 13362, LSU, Baton Rouge, East Baton Rouge Parish, Aug. 28, 1981; RLG 14782, Grand Chenier, Cameron Parish, July 9, 1983; MB 620, Evangeline State Park, St. Martinville, St. Martin Parish, March 26, 1982; MB 608, University of Southwestern Louisiana (USL), Lafayette, Lafayette Parish, Dec. 14, 1981; MB 642 and 648, USL, March 16, 1982; MB 641, Thomas Duckett Boyd oak, State Capitol Grounds, Baton Rouge, April 24, 1982; MB 1350, Jan. 13, 1982, MB 651, March 16, 1982, Avery Island, Iberia Parish; MB 957 and 974, Fontainebleau State Park, St. Tammany Parish, Oct 2, 1982;

MB 1052, Natchitoches, Natchitoches Parish, Oct. 16, 1982; MB 2056, Sulphur, Calcasie Parish, Nov. 30, 1983; MB 1530, New Orleans, Orleans Parish, Aug. 5, 1983; MB 642 and 648, March 16, 1982, MB 650, 651, 652, and 653, June 17, 1982, MB 624, April 5, 1982, all from LSU, Baton Rouge; A.L. Welden, TU 9635, New Orleans, June 22, 1983. MISSISSIPPI: MB 984, Gulf Coast Research Lab., Ocean Springs, Jackson County, Oct. 5, 1982; MB 987, Phillips College, Gulfport, Harrison County, Oct. 5, 1982. SOUTH CAROLINA: J.L. Lowe 12632, 12633, and 12634, Santee Exp. Forest, Huger, Berkeley County, Aug. 22, 1962. TEXAS: MB 1602 and 1604, Brackenridge Tract, University of Texas, Austin, Travis County, Dec. 2, 1983, on *Quercus virginiana* var. *fusiformis* (Small) Sarg. MEXICO: P.A. Lemke 5965 (TU 4829), Horsetail Falls, Nuevo Leon, Sept. 8, 1959 (host not given, *Q. virginiana* var. *fusiformis* occurs in the area). Inaccessible specimens of *P. phloiophila* were also observed in Texas by MB at the east bank of the Trinity River, Site of Mission Nuestra Senora de la Luz del Oreoquisac and Presidio San Augustin de Ahumada, Liberty County, on *Q. virginiana* var. *fusiformis*, Dec. 2, 1983. Fig. 4 shows the distribution of *P. phloiophila*.

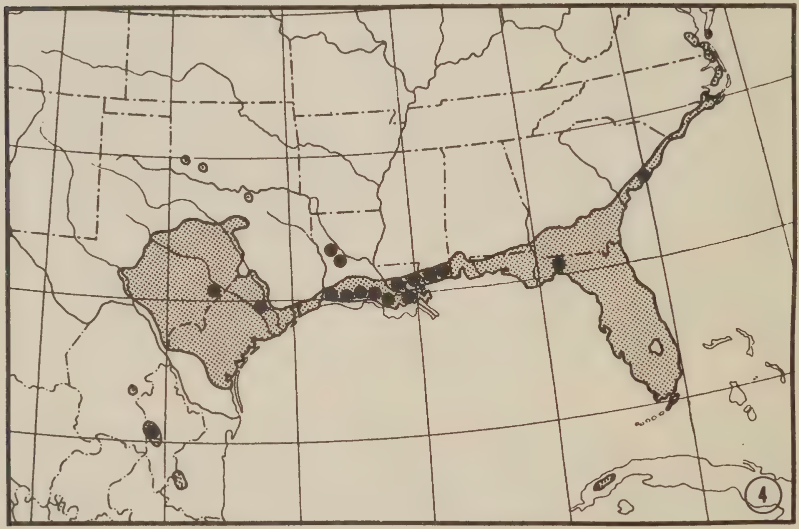


Fig. 4. Distribution of *Perenniporia phloiophila* (black circles). Crosshatched area indicates the natural range of live oak (from Little, 1971).

Perenniporia phloiophila is perhaps most similar to *P. medulla-panis* (Fr.) Donk, a widely distributed species on dead hardwoods throughout the temperate regions of the world. However, *P. phloiophila* is morphologically distinct because of its larger basidiospores (7.5-11 x 6-8 µm as compared to 5-7 x 3-5 µm for *P. medulla-panis*) and specific habit and host relationship. Furthermore, it is genetically isolated from *P. medulla-panis* with homokaryons from the two species completely incompatible. *Perenniporia fraxinophila* (Pk.) Ryv. has basidiospores more like those of *P. phloiophila* but differs in producing large pileate basidiocarps and occurring mainly on ash. *Perenniporia fraxinophila* is also genetically isolated from *P. phloiophila.*

HYPHODERMA BACULORUBRENSE Gilbn. et M. Blackwell, sp. nov.

Fructificatio resupinata, annua, effusa in pannus usque ad 5 cm, cremea vel ochracea, leves vel tuberculata; systema hypharum monomiticum, hyphae fibulatae; gloeocystidia 5-12 µm in diam, usque ad 85 µm longae, ventricosae vel cylindricae; basidia 35-40 x 8-9 µm, clavatae; basidiosporae 8-10.5 x 5-7 µm, ellipsoidae, hyalinae, non-amyloidae. Typus: on *Quercus virginiana* Mill., Louisiana State Univ., Baton Rouge, East Baton Rouge Parish, LA, M. Blackwell no. 737, Aug. 25, 1982 (BPI).

Basidiocarps resupinate, annual or persisting longer than one year, effused up to 5 cm, developing in bark crevices and conforming to topography of bark; hymenial surface cream colored to pale buff or ochraceous, often with greenish tints from associated algae, smooth to shallowly tuberculate; margin abrupt to thinning out; subiculum white to cream, less than 1 mm thick.

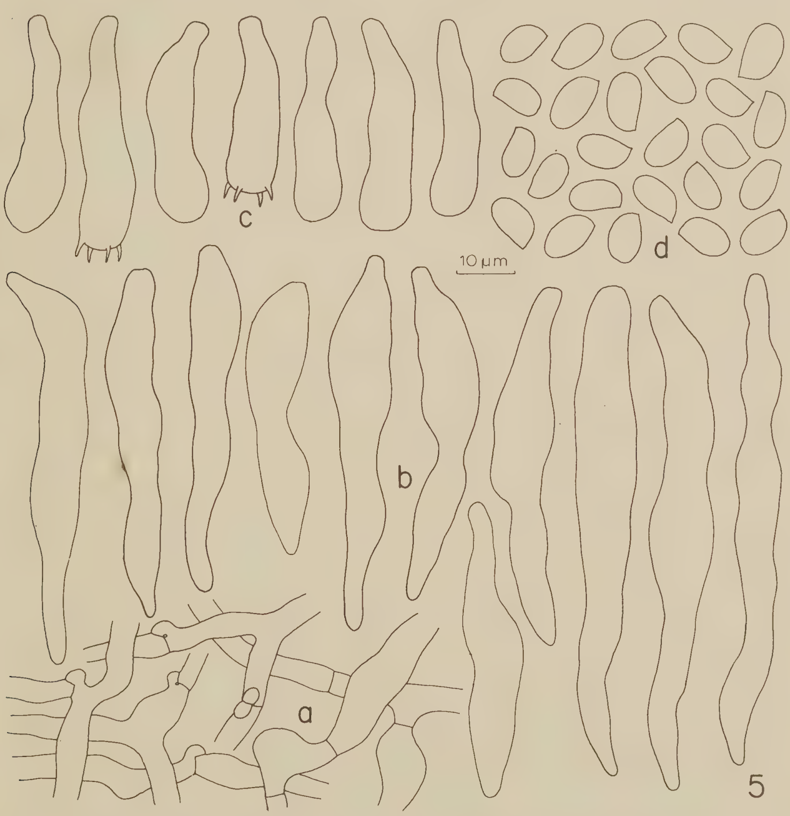


Fig. 5. Microscopic characters of *Hyphoderma baculorubrense.* a, generative hyphae; b, gloeocystidia; c, basidia; d, basidiospores. (MB 737, Type).

Hyphal system monomitic; generative hyphae (Fig. 5a) 2.5-6 µm in diam, thin-walled, with clamps, coarse crystalline material abundant on hyphae and scattered throughout subiculum; gloeocystidia (Fig. 5b) 5-12 µm in diam and up to 85 µm long, abundant and conspicuous, arising at all levels of the subiculum, imbedded or projecting slightly beyond the basidia, highly refractive in Melzer's reagent and staining brightly in phloxine, ventricose to cylindric, bluntly to acutely fusoid; basidia (Fig. 5c) 35-40 x 8-9 µm, clavate, 4-sterigmate, with a basal clamp; basidiospores (Fig. 5d) 8-10.5 x 5-7 µm, ellipsoid, hyaline, smooth, negative in Melzer's reagent.

ADDITIONAL SPECIMENS EXAMINED: LOUISIANA: MB 618, Feb. 15, 1982, 625, 626, and 629, Feb. 23, 1982, 640, April 15, 1982, 646, March 1, 1982, 991, Oct. 9, 1982; 1127, 1128, 1129, 1130, and 1131, Nov. 23, 1982, all from LSU, Baton Rouge; RLG 13291, Sept. 18, 1981, 13307, Aug. 27, 1981, 13361, Aug. 28, 1981, all from LSU, Baton Rouge; MB 940, 958, 972A, 973, all from Fontainebleau State Park, St. Tammany Parish, Oct. 2, 1982; MB 616 and 617, St. Martinville, St. Martin Parish, March 26, 1982; MB 649, New Iberia, Iberia Parish, March 26, 1982; MB 653, Avery Island, Iberia Parish, March 26, 1982; MB 2057, Sulphur, Calcasie Parish, Nov. 30, 1983; RLG 14778, Pecan Island, Vermilion Parish, July 9, 1983; RLG 14781, LA Highway 82, Cameron Parish, July 9, 1983; RLG 14999, Audubon Park, New Orleans, Orleans Parish, Nov. 14, 1983. MISSISSIPPI: MB 982, Univ. of Southern Mississippi, Hattiesburg, Lamar County, Oct. 5, 1982; MB 983, Gulf Coast Research Lab., Ocean Springs, Jackson County, Oct. 5, 1982. TEXAS: MB 1611, East Bank of Trinity River at site of Mission Nuestra Senora de la Luz del Oreoquisac and Presidio San Augustin de Ahumada, Liberty County, Dec. 2, 1983; MB 2061, 2062, and 2066, Burton, Washington County, Dec. 1, 1983; MB 2053, west bank of Trinity River, Chambers County, Nov. 30, 1983; MB 2074 and 2075, Austin, Travis County, Dec. 1, 1983. All Texas collections were on *Q. virginiana* var. *fusiformis*. Fig. 6 shows the distribution of *H. baculorubrense*.

Hyphoderma baculorubrense is similar to *H. praetermissum* (Karst.) John Erikss. et Strid, a widely distributed and highly variable taxon. The spores of *H. baculorubrense* are broadly ellipsoid in contrast to the cylindric-allantoid spores of *H. praetermissum*. The latter species usually has capitate hymenial cystidia. These are never present in *H. baculorubrense*. Homokaryons of the two species are completely incompatible.

Perenniporia phloiophila and *H. baculorubrense* are both known only from living live oak. We have no records of either species on other hosts including other species of oak commonly associated with live oak in the Gulf Coast region.

Perenniporia phloiophila commonly fruits profusely on bark of large living branches and main stems of trees that show no dieback or other symptoms of deterioration. Sections of branches infected with *P. phloiophila* show that mycelium is usually restricted to the dead, nonconducting outer bark. However, in one instance, damage of bark by insects and birds apparently resulted in invasion of underlying wood by the fungus, and subsequent development of a uniform white rot. Isolates of *P. phloiophila* from bark and decayed wood of this collection were identical with isolates obtained from mass basidiospores.

Because *H. baculorubrense* occurs only on the main trunk or large lower branches of mature trees it has not been possible to obtain sections. Increment borer samples from the bark were so badly decayed that

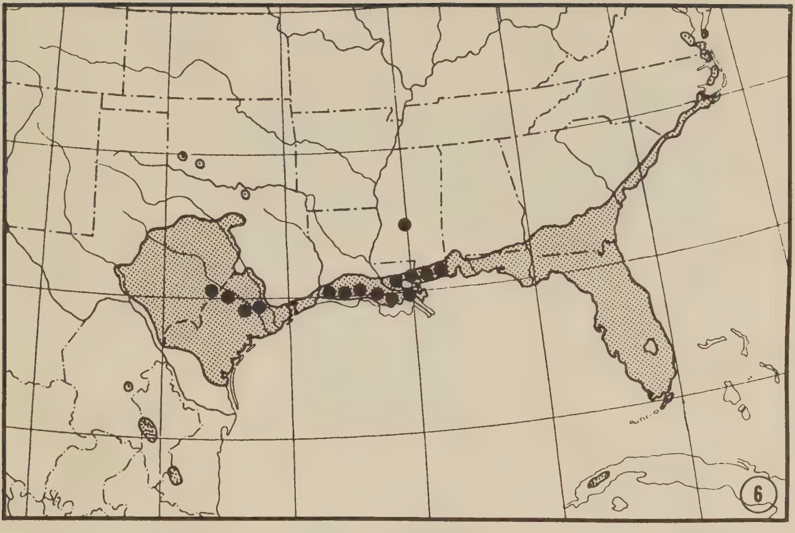


Fig. 6. Distribution of *Hyphoderma baculorubrense* (black circles). Crosshatched area indicates the natural range of live oak (from Little, 1971).

the exact limit of the decay could not be determined. Decay is apparently restricted to the older, deeply ridged outer bark and causes sloughing of the outer bark leaving a bark surface smoother than normal. This results in a condition commonly known as "smooth patch." Smooth patch has been reported on *Quercus alba* L. (white oak) associated with *Aleurodiscus oakesii* (Berk. et Curt.) Cke. (Tehon and Jacks, 1933) and on *Q. alba* and *Q. stellata* Wangenh. (post oak) associated with *Corticium maculare* Lair (Lair, 1946). *Hyphoderma baculorubrense* is almost certainly the "bark-rotting fungus" mentioned by Penfound and Mackaness (1940) on live oaks in Louisiana. They reported that mycelial growth and decay of bark in flowways on the trees increased bark water-holding capacity and allowed invasion by liverworts and mosses. They also observed bark sloughing associated with the fungus. Mycelium of *H. baculorubrense* occurs in flowways and basidiocarps usually develop at the edges of flowways.

No other species of *Perenniporia* or *Hyphoderma* are known to be restricted to bark of a single species of living tree. *Perenniporia ohiensis* (Berk.) Ryv. has recently been collected on living live oak in Texas (MB 1603, 2064, 2069, and 2070, ARIZ). However, *P. ohiensis* is widely distributed and occurs on many other hardwood species. Considering the high incidence of *P. phloiophila* and *H. baculorubrense*, it is surprising that neither species has been described previously. Several workers have collected *P. phloiophila* in the past as indicated in the specimens listed earlier in this paper. Cultures at the U.S. Forest Service Center for Forest Mycology Research, Forest Products Lab., Madison, WI were tentatively identified as *Poria beaumontii* Berk. et Curt. Our study of an isotype of *P. beaumontii* (BPI) disclosed that it is sterile and unidentifiable with certainty, but a species with macro-

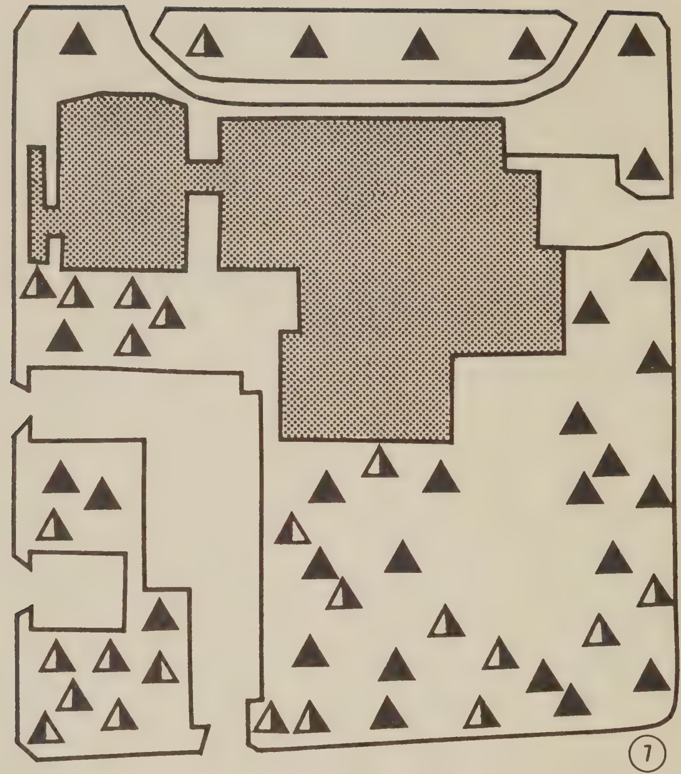


Fig. 7. Diagram of study area in Memorial Oak Grove near LSU Union (crosshatched area) showing incidence of *Perenniporia phloiophila* (◭) and *Hyphoderma baculorubrense* (◮) on 51 living oak trees. A solid triangle indicates presence of both fungi on a single tree.

morphology and hyphal structure different from those of *P. phloiophila*.

A high frequency of infection was found wherever we observed these fungi in Louisiana. In the Memorial Oak Grove at the Union Building on the LSU campus 51 live oaks about 65 years of age were carefully examined for the presence of *P. phloiophila* and *H. baculorubrense*. At least one of the two fungi was observed to be fruiting on all 51 trees. *Perenniporia phloiophila* was found fruiting on 31 trees, and *H. baculorubrense* on 48 trees. Both fungi were present on 28 trees (Fig. 7). Both species are probably distributed throughout the natural range of live oak. Older live oaks planted as ornamentals outside their natural range in Louisiana and Mississippi are also known to be infected (Figs. 4 and 6).

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MYCOTAXON

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A NEW STIPITATE HYDNUM OF NOVA SCOTIA

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KEY WORDS: *Sarcodon dissimulans*, Hydnaceae, basidiomycetes, fungi.

A new stipitate hydnum has been found in Nova Scotia. *Sarcodon dissimulans* resembles *S. lanuginosum* (K. Harrison) Maas G. in extreme age; however, the other stages are different and the new species is easily recognized in the field when growing actively and in the herbarium it is darker and not distinctly scaly. This taxon is known only from the type locality and was first seen in 1980 as very old specimens with extremely obnoxious taste and odors.

All color terms placed within quotations are taken from Ridgway (1912), and others are our own. Scanning electron micrographs were taken on a JEOL JSM 25 scanning electron microscope using spores from a spore print. The holotype and other collections cited are deposited in the E.C. Smith Herbarium (ACAD), Acadia University.

Sarcodon dissimulans K. Harrison sp. nov.

Pileus 3.5-13 cm latus, connatus, convexus; bubalinus vel brunneus; tomentosus vel scabridus, rimosus; ad marginem pallida, inflexa; odor et sapor ingratus, pungentes. Contexus pallidus vel bubalinus, brunnescens. Aculeis avellaneis, tenui, confertis. Stipes 3-6 cm longus, 1-3 cm crassus, tomentosus val glaber, bubalinus; basi mycelio pallido. Sporae 5-6 x 4-5 µm, subglobosae, tuberculatae. Haribatio prope Picea. Habitus gregarious, in sylvis prope Black Hole, commitato Kings lectus. Holotypus ACAD 14897 in Universitatis Michiganiae et pars in DAOM, Ottawa conservatus.

Basidiocarp: 3.5-1.3 cm broad, convex, usually connate and compressed in various shapes with numerous lobes; surface irregular, when young exuding a few drops of pinkish liquids, finely tomentose to finely fibrillose becoming minutely scaly or with innate fibrils and fine cracks, in age scaly on disc with radiating innate fibrils or finely cracked areas toward the margin; margin faintly tomentose (lens), appearing glabrous, strongly incurved, sterile, color when young "Avellaneous" becoming "Buffy Brown" to "Natal Brown" on the disc, darkening on the younger parts when handled or bruised; context firm but brittle, "Avellaneous", darkening when cut to "Wood Brown"; taste extremely disagreeable, pungent and persistent in the throat; odor faintly aromatic, pungent, unpleasant. Stipe 3-6 x 1-2 cm, rarely with a short tapering root, usually rather blunt for the larger compound basidiocarps, expanding quickly and branching into stipes with complexly fused pilei; surface limited, finely tomentose in protected areas, glabrous, whitish to "Tilleul Buff" or "Avellaneous" to an uneven line of tiny spines slightly decurrent on the apex of the stipes; context near "Wood Brown", darkest downward, darkening when cut to "Wood Brown", tips persist as "Avellaneous", overall color changes with angle of light. Spore mass on overlapping surface of pileus "Army Brown".

Microscopic details: Spores 5-6(7) x 4-5 µm, subglobose to slightly oblong, coarsely tuberculate, basidia closely packed and difficult to separate in KOH by crushing, no clamps observed in any tissue. Hyphae of tramal tissues hyaline, equal, thin-walled, a few somewhat inflated 4-10(12) µm, branching and closely interwoven, epidermal hyphae of pileus inflated to 12 µm, more loosely interwoven and cells somewhat larger than in tramal tissues. The end cells of cuticular hyphae not differentiated. Gloeoperous hyphae 4-8 µm wide, light-brown, present occasionally in all tramal tissues. Hyphae in context of spines 4-5 µm wide and in stipe 2-4 µm wide. Cystidia not observed in hymenium, pileus or stipe.

Electron photomicrographs: Photomicrographs of young spores (Fig. 1) show the nodulose nature of the tubercles and the globular appearance of the spores. Fig. 2 illustrates an older spore with the tubercules larger and the outline more irregular. The tubercle adjacent to the jagged edge of the apiculus is of interest and was seen in several SEM fields when searching for suitable material to photograph.

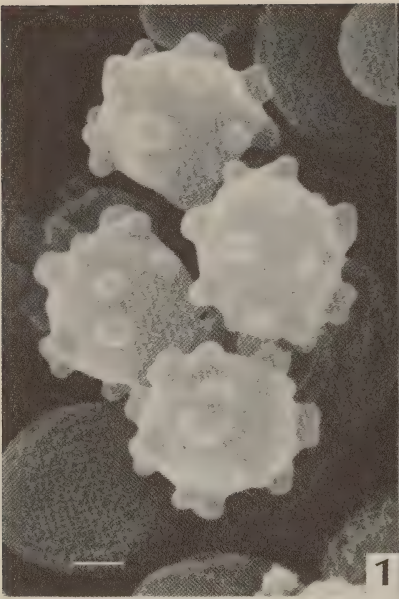
DISCUSSION

S. dissimulans was found in quantity in 1983 and was followed through its stages of growth and found to differ significantly in surface features, color, odor, and taste from *Hydnum lanuginosum* K. Harrison (1961, 1964). In the herbarium it is darker and distinctly scaly. The spores are similar microscopically, but under the S.E.M. the new taxon has small nodulose tubercules compared to the larger and broader ones of *S. lanuginosum*.

The following characters are sufficiently distinct to enable the two species to be easily separated in the field.

	S. dissimulans (Fig. 3)	*S. lanuginosum* (Fig. 4)
Pileus: (young)	Exuding red droplets Tomentose	No red droplets Usually grayish
Pileus: (mature)	Brown, rivulose cracks, a few fine scales on disc	Intensely scaly scales with black tips
Habit:	Connate, in complex clumps	Usually simple
Taste:	Extremely nauseating	Farinaceous, slowly acrid in throat
Margin:	Strongly lobed	Usually regular
Stipe:	Short, branched	Often long, not branched
Dried:	Dark, fuscous, wrinkled	Grayish and scaly

Reddish drops have been seen twice on the stipes of young *S. lanuginosum* which was one of the more common hydnums in this area in 1983. The microscopic details are similar with the spores in the same size range. Young spores of *S. dissimulans* have distinct rounded tabercles that have not been seen in any specimen of *S. lanuginosum*. The tramal hyphae are not as inflated in the new species and the texture is extremely brittle with the margin easily damaged.



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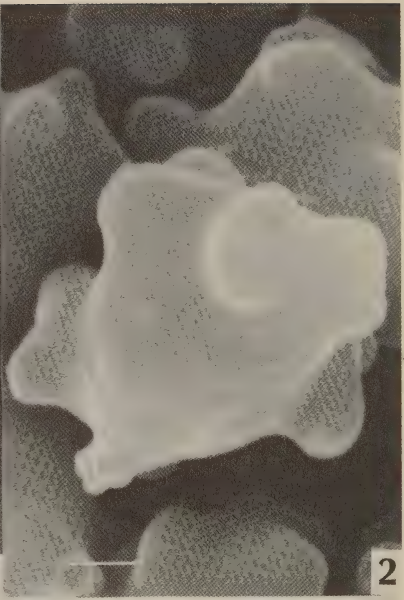

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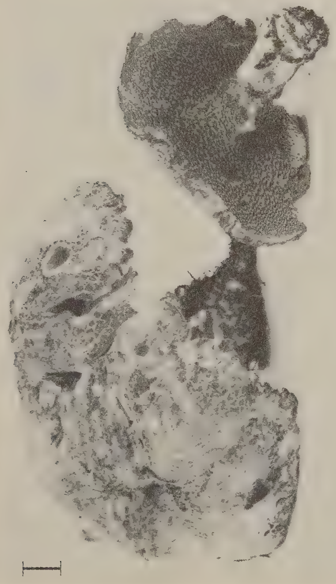

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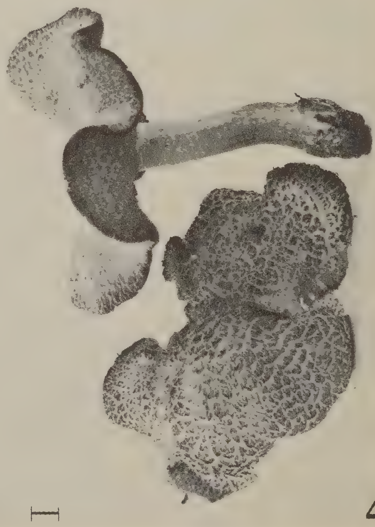

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ACKNOWLEDGEMENT

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FIGURES

Figs. 1-3: *S. dissimulans*: Fig. 1 - young spores showing developing tubercles. Fig. 2 - single spore with tubercule associated hilar appendix. Fig. 3 - photograph of part of holotype collection (ACAD 14897).

Fig. 4 - *S. lanuginosum* showing scaly pileus and eccentric and mesopodial specimens. Scale bars for Figs. 1, 2 equal 1 µm, and for Figs. 3, 4 equal 1 cm.

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NEW NORTH AMERICAN SPECIES OF LACCARIA (AGARICALES)[1]

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ABSTRACT

Five new species in the genus Laccaria are described and discussed. The new species are L. amethysteo-occidentalis, L. nobilis, L. oblongospora, L. trichodermophora, and L. vinaceo-brunnea. Circumscriptions of these taxa are based on macro- and micromorphological characters of the basidiocarp along with cultural characters acquired through somatic culture mat analysis of isolates obtained via tissue culture.

Key words: Laccaria, Agaricales, Tricholomataceae, taxonomy, cultural characters

INTRODUCTION

Extensive collecting was carried out in several regions of the United States and Canada as part of an ongoing study of the floristically (e.g., Singer 1975) and ecologically (e.g., Singer and Moser 1965, Trappe 1977, Watling 1977) important ectomycorrhizal genus Laccaria Berk. & Br. (Agaricales, Tricholomataceae). Numerous herbarium collections and all available type specimens were also examined (Mueller 1982). In order to obtain additional data, attempts were made to examine the somatic culture mat morphology of each putative taxon.

A result of these studies has been the segregation of three new species from L. laccata (Scop. : Fr.) Berk. & Br. sensu lato and two from L. amethystina (Hud.) Ck. described below.

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[1] This paper is based on a portion of a thesis submitted to the Graduate School of the University of Tennessee, Knoxville in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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MATERIALS AND METHODS

Collections were made, assembled, and examined using standard techniques. Color names within parentheses and quotation marks are from Ridgway (1912) while color names outside of parentheses are author-generated. All specimens are deposited in the University of Tennessee Herbarium, Knoxville (= TENN). A list of the 181 collections examined for this paper will be supplied upon request.

Basidospore size data are always given without ornamentation and hilar appendage and were obtained with the hilar appendage in profile. In order to treat all specimens equally, all basidiospore measurements were taken from hymenial tissue and not from spore prints. Width and diameter measurements of other elements were taken at the widest point. At least 10 randomly sampled cheilocystidia and terminal cells of cuticular hyphae and 15 randomly sampled basidia and basidiospores were measured for each collection included in the composite descriptions. These collections were sampled from the pool of material that I had examined for each taxon and include the range of variation encountered within their respective species.

To give some indication of data reliability, the number of elements measured and utilized for compilation of range, length-width ratios, and means are given in parentheses before size data for cuticular hyphae, cheilocystidia, and basidia. For basidiospores, the number of collections used in the description are included in brackets with spore size data (Bas 1974). Within the brackets, the first figure represents the number of spores measured and the second figure the number of collections utilized.

To obtain dikaryotic isolates, small pieces of tramal tissue excised from the pileus-stipe interface were aseptically placed on modified Melin-Norkrans medium (= MNM) plus benomyl (10 mg/l) in disposable test tubes (Molina and Palmer 1982). Initial experimentation with the inclusion of various antibiotics in the medium appeared to have little effect on bacterial contamination and, thus, they were not used subsequently. Six to ten replicates were taken for each isolation attempted. Subculturing of each isolate was undertaken until a pure culture was obtained. Stock isolates were then stored on MNM in the dark at 4°C.

Culture mat analyses were based on the classic work of Nobles (e.g., 1965) and that of Campbell and Petersen (1975). Plastic Petri dishes containing malt extract agar (= MA) (Nobles 1965) were inoculated with mycelium of the isolates being examined and incubated in the dark at 24°C for two weeks. From these, round inoculation plugs 5 mm in diam were transferred to the edge of Petri dishes containing either MNM, MA, or Difco potato dextrose agar (= PDA). Seven replicates of each medium for each isolate were inoculated and placed in a dark incubator at 24°C. Macromorphological descriptions were made during the third and sixth weeks, while micromorphological characters were examined during the sixth week. Terminology used was taken from Nobles (e.g., 1965).

Initially, extracellular oxidase activity of each isolate was tested using both the Bavendamm (Davidson et al. 1938) and gum guaiac (Nobles 1965) tests. However, since no growth or diffusion zone occurred in the Bavendamm test, it was not used subsequently. For the gum guaiac test, observations were made after 2-3 minutes and then again at 1 hour.

RESULTS AND DISCUSSION

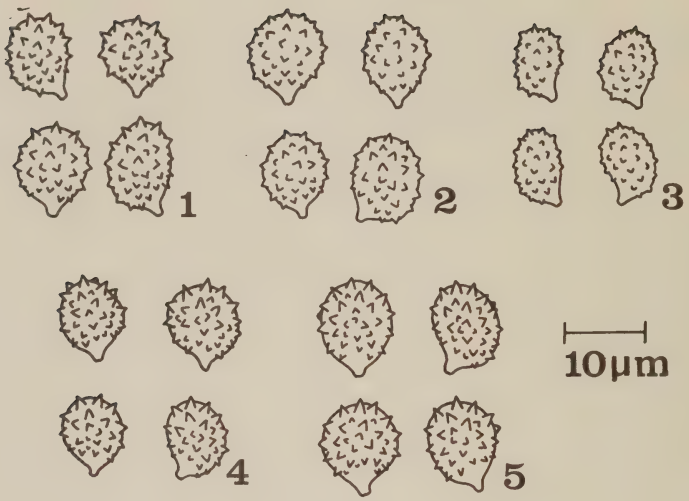
Laccaria amethysteo-occidentalis Mueller. sp. nov. Figs. 1, 6, 11, 17.

Pileo 10-65(-89) mm lato, haud striato, purpureo-violaceo, siccando vinaceo vel pallido, lamellis concoloribus. Stipite 18-115 x 3-12 mm, fortiter striato, concolori. Basidiis tetrasporis. Cheilocystidiis grandibus, abundis. Sporis plerumque 7.4-10.6 x 6.4-9.2 μm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis curtis vel moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42526; Canada: British Columbia, near Squamish, Alice Lake Provincial Park campground. 3.X.1981. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus 10-65(-89) mm broad, obtuse to convex to plane, often depressed, not striate when fresh, occasionally becoming slightly translucent-striate upon fading, finely fibrillose to fibrillose-scaly, hygrophanous, deep purple when fresh ("Taupe Brown" to "Dull Indian Purple" to "Dusky Dull Violet I" to "Dark Hyssop Violet" to "Slate-Violet"), fading to vinaceous ("Dark Vinaceous-Drab" to "Dark Vinaceous-Gray" to near "Wood Brown"), finally becoming buff (near "Pale Ochraceous-Salmon"); margin inrolled to decurved, becoming plane, entire to eroded; context thin, concolorous with lighter gray purple ("Pale Bluish Lavender") to white areas intermixed. Lamellae narrow to broad, thick to very thick, occasionally waxy, sinuate to arcuate, subdistant to distant, dark violaceous ("Deep Slate-Violet" to "Slate-Violet"), fading lighter (near "Lavender"). Stipe 18-115 x 3-12 mm, equal to subclavate, occasionally slightly bulbose, dry, strongly longitudinally striate, occasionally with recurved scales, purple ("Dark Slate-Purple" to "Dark Vinaceous Brown" to "Hay's Brown"), often with lighter violet ("Pale Bluish Lavender") to white scattered sectors; context solid, concolorous with pileus context. Basal mycelium violet ("Dark Slate-Purple" to "Deep Slate-Violet" to "Light Dull Bluish Violet"). Spores white in mass.

MICROMORPHOLOGY: PILEUS: Pileipellis tightly interwoven with scattered elongate fascicles of ± perpendicular hyphae, fascicles usually composed of 15-30 hyphae; terminal cells of fascicular hyphae (n=30) 28.5-73.5 x 7-16 μm, undifferentiated to clavate, occasionally broadly clavate; walls up to 0.5 μm thick, vinaceous brown; contents hyaline to light vinaceous brown. Trama tightly interwoven, undifferentiated, hyaline, light vinaceous brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 3-11.5 μm diam, thin-walled, hyaline to light vinaceous brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 45) 34-56.5 x 9.7-14.7 μm, clavate, elongate, hyaline, in young specimens vinaceous brown in mass; sterigmata 4, up to 9.2 μm long. Pleurocystidia lacking. Cheilocystidia (n = 20) 36.5-66.5 x 12-18.4 μm, subclavate to clavate, often very abundant, extending well beyond basidia, thin-walled, hyaline. Basidiospores (excluding ornamentation) [81/6](6.4-)7.4-10.6 x 6.4-9.2 μm (mean dimensions = 8.9±0.8 x 7.8±0.6 μm), L/W = (0.95-)1-1.24(-1.36) (mean L/W = 1.13± 0.08), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, echinulate; spines < 0.5-1.4 (-1.8) μm long (mean length = 1± 0.3 μm), crowded; hilar appendix 1.3-2 μm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 2.7-7.5 μm diam, hyaline, undifferentiated, long-celled.



Figs. 1-5. Representative basidiospores from the Holotype of each of the proposed species. Fig. 1. *L. amethysteo-occidentalis* (TENN 42526). Fig. 2. *L. nobilis* (TENN 42527). Fig. 3. *L. oblongospora* (TENN 42522). Fig. 4. *L. trichodermophora* (TENN 42523). Fig. 5. *L. vinaceo-brunnea* (TENN 42525).

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 1 isolate): PDA: *Radius* at week III < 3 mm, at week VI = 12-14 mm; *mat* felty, moderately thick, tightly interwoven, submerged, not translucent, dark violet; *margin* up to 3 mm broad, subfelty, abruptly thinner than mat, entire, light violet; *plug* dark violet. MNM: *Radius* at week III = 14-22 mm, at week VI = 24-32 mm; *mat* felty, moderately thick, tightly interwoven, thicker near plug, submerged, not translucent, moderate violet color, darker near plug, becoming lighter outward; *margin* 1-2 mm broad, subfelty to silky, not well differentiated from mat, even to serrate, light violet; *plug* moderate violet. MA: *Radius* at week III = 14-17 mm, at week VI = 23-27 mm; *mat* subfelty, moderately thick and interwoven with a narrow (3 mm) thicker band at midpoint, submerged, slightly translucent, white; *margin* 1-2 mm broad, subfeltly not well differentiated, entire to somewhat serrate, white; *plug* white. EXTRACELLULAR OXIDASE: *Reaction* negative at first, moderate blue color after 1 hr.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 1 isolate): PDA: Hyphae mostly undifferentiated, few scattered subcoralloid hyphae in some plates. MNM: Hyphae same as in PDA. MA: Hyphae undifferentiated.

HABITAT AND DISTRIBUTION: Scattered to gregarious; under conifers often Pseudotsuga menziesii (Mirb.) Franco ; western North America. Number of collections examined per province or state: British Columbia 8; California 26; Oregon 21; Washington 28.

OBSERVATIONS: Although this taxon has been reported as L. amethystina, it differs in several important respects, and thus, is described here as a distinct species. Laccaria amethysteo-occidentalis can be distinguished from L. amethystina by its distribution, larger basidiocarp size, and deeper purple color which becomes vinaceous upon fading. Additionally, it has subglobose to broadly ellipsoidal, short-spined basidiospores instead of the nearly globose, moderate to long-spined basidiospores of L. amethystina. It differs from the other North American "purple" Laccaria, L. vinaceo-brunnea sp. nov., by its robust size, the color of its mature basidiocarps, and its pileipellis of scattered fascicles rather than individual perpendicular hyphae. All three taxa often have large cheilocystidia which form a nearly continuous layer along the lamella margin. This character can be used to distinguish herbarium material lacking macromorphological notes of L. amethysteo-occidentalis from L. bicolor (Maire) Orton and L. ochropurpurea (Berk.) Pk.

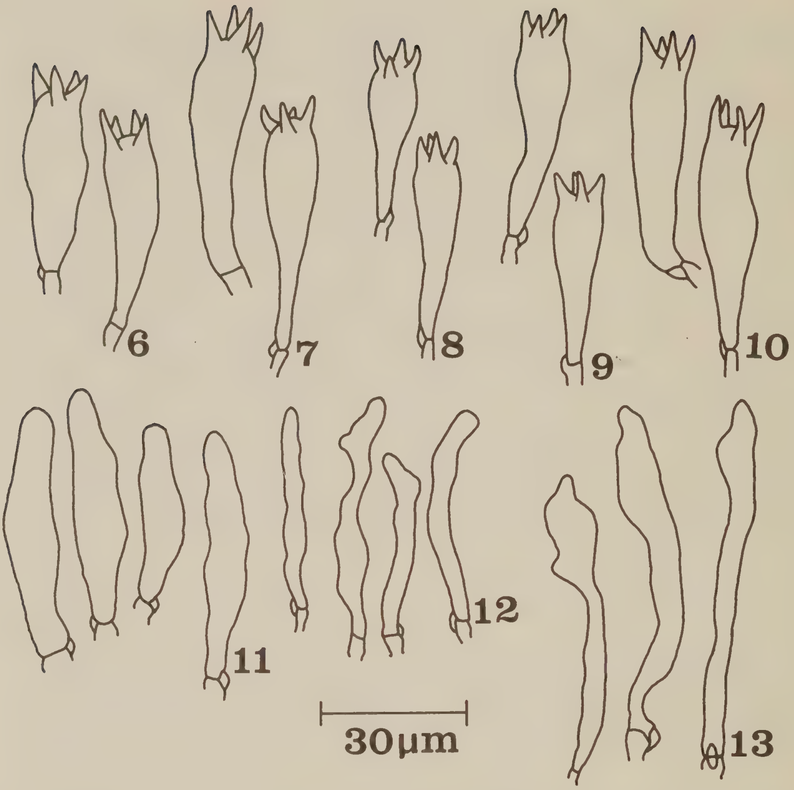
The above description of culture mat morphology was based on a single isolate, TENN 42526. Numerous attempts to obtain additional isolates were unsuccessful. The slow rate of growth of and dark purple color of the culture mat on PDA was similar to the growth of L. ochropurpurea (Figs. 17, 18).

Laccaria amethysteo-occidentalis can be found commonly in the coniferous forests of the northwestern U. S. and western Canada. In contrast, within the range of this study L. amethystina appears to be restricted to the mixed conifer-hardwood forests of eastern North America while L. vinaceo-brunnea has only been found along the Gulf Coast.

Laccaria nobilis Smith apud Mueller. sp. nov. Figs. 2, 7, 19.
[Laccaria nobilis Smith in herb.]

Pileo (16-)24-77 mm lato, haud striato, paulatim squamoso, aurantio-brunneo. Lamelis carneorosellis. Stipite (21-)26-110 x 4-10(-16) mm, fortiter striato, interdum reticulato, frequenter squamoso, concolori; mycelio basali albo. Basidiis tetrasporis. Cheilocystidiis nullis. Sporis 7.4-9.7 x 6.4-8.7 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis brevis.

Type specimen (HOLOTYPE): TENN - TENN 42527; USA: Colorado, Larimer Co., Roosevelt National Forest, Rayah Wilderness, Blue Lake Trail. 13.IX.1981 [!]



Figs. 6-13. Representative basidia and cheilocystidia. Note the similarities between basidia. Fig. 6. Basidia of *L. amethysteo-occidentalis* (TENN 42526). Fig. 7. Basidia of *L. nobilis* (TENN 42527). Fig. 8. Basidia of *L. oblongospora* (TENN 42522). Fig. 9. Basidia of *L. trichodermophora* (TENN 42523). Fig. 10. Basidia of *L. vinaceo-brunnea* (TENN 42525). Fig. 11. Cheilocystidia of *L. amethysteo-occidentalis* (TENN 42582). Fig. 12. Cheilocystidia of *L. oblongospora* (TENN 42522). Fig. 13. Cheilocystidia of *L. vinaceo-brunnea* (TENN 42525).

MACROMORPHOLOGY: BASIDIOMA: Pileus (16-)24-77 mm broad, convex to plane, occasionally becoming uplifted, depressed to deeply depressed, not striate, fibrillose-scaly becoming scaly to squarrose, brownish orange ("Sanford's Brown" to "Cinnamon-Rufous"), occasionally darker at disc ("Hazel"); margin decurved to plane, occasionally becoming upturned, entire to eroded; context thin, concolorous. Lamellae moderately broad to very broad, moderately thick to thick, sinuate to adnate, close to distant, pinkish flesh color ("Flesh Color" to "Pale Flesh Color" to "Orange-Pink"). Stipe (21)26-110 x 4-10(-16) mm, equal to slightly bulbous, dry, fibrillose, fibers forming prominant longitudinal striations, occasionally almost forming reticulate ridges, often with recurved scales near apex when mature, concolorous with pileus. Basal mycelium white. Spores white in mass.

MICROMORPHOLOGY: PILEUS: Pileipellis interwoven with scattered fascicles of ± perpendicular hyphae; fascicles usually composed of 15-30 or more hyphae; terminal cells of fascicular hyphae (n = 52) 34.5-59.8(-73.6) x (4-)7-13.8(-19.3) µm, subclavate to clavate, occasionally broadly clavate or capitate; walls up to 0.5 µm thick, light to moderate yellowish brown; contents hyaline to light yellowish brown. Trama tightly interwoven, undifferentiated, hyaline, light yellowish brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 2.8-10 µm diam, thin-walled, hyaline to light yellowish brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 75) 32.2-55 x 7.8-13.8 µm, clavate, elongate, hyaline; sterigmata 4, up to 8.7 µm long. Pleurocystidia lacking. Cheilocystidia lacking. Basidiospores (excluding ornamentation) [75/4] 7.4-9.7(-10.6) x 6.4-8.7 µm (mean dimensions = 8.5±0.7 x 7.5±0.6 µm), L/W = 1-1.26(-1.33) (mean L/W = 1.15±0.09), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, hyaline, echinulate; spines < 0.5-1.4 µm long (mean length = 0.9±0.2 µm), crowded; hilar appendix 1.3-2 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 1.8-12 µm diam, tightly interwoven, hyaline; cell long, undifferentated to barrel-shaped.

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 2 isolates): PDA: Radius at week III = 23-34 mm, at week VI = 35-43 mm; mat felty, moderately thick to thick, tightly interwoven, almost crustose, submerged, with time forming a pruinose aerial layer away from plug, not translucent, at first dark bright violet, soon fading, by week VI the dark purple color restricted to a 7-9 mm band near margin, rest of mat light orange brown; pruinose aerial hyphae light grayish purple becoming light orange brown; margin 3-4 mm broad, subfelty, thin, very uneven, light violet to white; plug concolorous with mat. MNM: Radius at week III = 40-47 mm, at week VI = 67-78 mm; mat subfelty, thin, becoming slightly thicker with age, loosely to tightly interwoven, submerged, translucent to slightly translucent, light violet, color often becoming restricted to 3-4 mm band at midpoint, remainder of mat white; margin 3-6 mm broad, silky to subfelty, thin, parallel to loosely interwoven, entire, very light violet to white; plug concolorous with mat. MA: Radius at week III 33-47 mm, at week VI = 47-77 mm; mat subfelty, thin to slightly thicker near plug, loosely interwoven, submerged, translucent, white; margin 1-2 mm broad, subfelty, thinner than mat, undulate, white; plug white. EXTRACELLULAR OXIDASE: Reaction moderate blue color immediately, unchanging.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 2 isolates): PDA: Hyphae mostly undifferentiated with occasional irregular swollen hyphae, purplish brown in mass. MNM: Hyphae mostly undifferentiated with rare, widely scattered irregular swollen hyphae near margin. MA: Hyphae undifferentiated.

HABITAT AND DISTRIBUTION: Solitary to scattered; usually at high elevations (below tree line); Cascade and Rocky Mts. Number of collections examined per state: Colorado 13; Idaho 1; New Mexico 1; Washington 2.

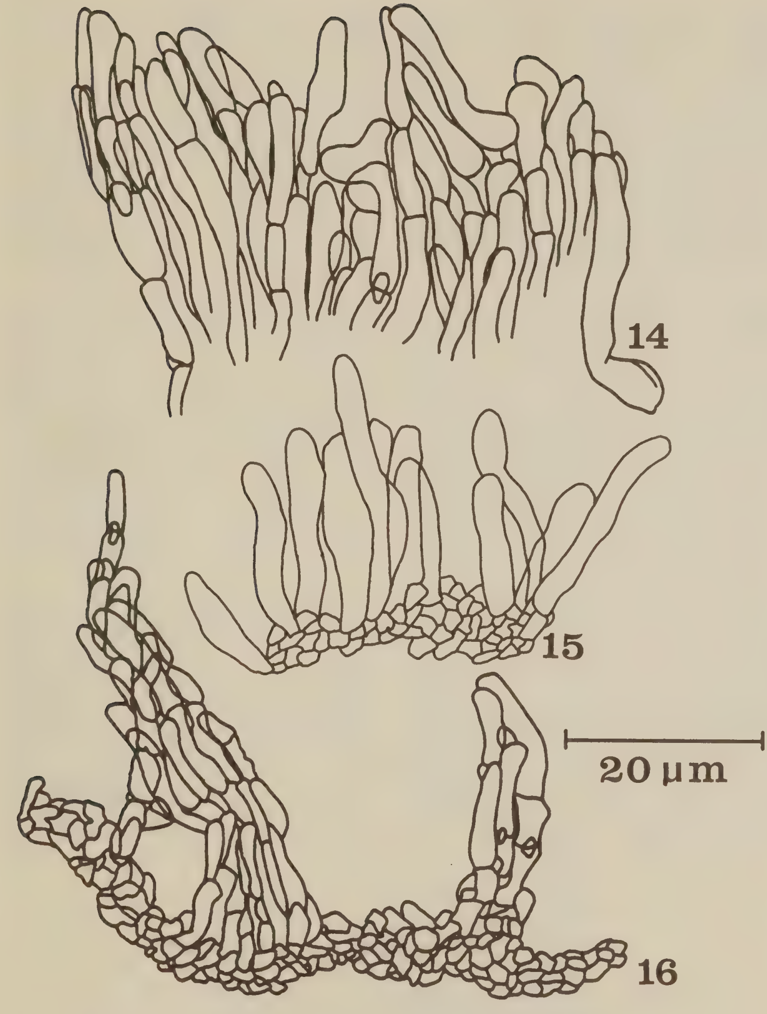
OBSERVATIONS: Laccaria nobilis can be distinguished from other members of the "L. laccata complex" by its large size, scaly to squarrose pileus and scaly to almost reticulate stipe. Its culture mat morphology differs from L. laccata sensu stricto by displaying a relatively fast growth rate and purple to violaceous mat color on PDA and MNM in contrast to the slow growth and white mat color on all three media exhibited by L. laccata (Figs. 19, 20). Alexander H. Smith proposed the name L. nobilis in an unpublished manuscript along with several other proposed taxa including L. pisciodorus (Smith no. 18812) and L. sphagnicola (Smith no. 4573). These latter two taxa were judged not sufficiently distinct (based on available material) to justify validly publishing these epithets.

Laccaria oblongospora Mueller. sp. nov. Figs. 3, 8, 12, 16, 21.

Pileo (5-)12-59 mm lato, haud striato, aurantio-brunneo, interdim vinaceo. Lamellis plerumque carneorosellis, interdum vinaceis. Stipite (11-)20-65 x 2-12 mm, interdum striato, concolori; mycelio basali plerumque albo, interdum violaceo. Basidiis tetrasporis. Cheilocystidiis nullis vel dispersis. Sporis 7.4-10 x 5-7 µm sine ornamentatione, ellipsoideis vel oblongis, echinatis; breve spinosis.

Type specimen (HOLOTYPE): TENN - TENN 42522; USA: Mississippi, Harrison Co., DeSoto National Forest, Harrison Experimental Forest, Road H-8. 7.XII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus (5-)12-59 mm broad, obtuse to convex, becoming plane to uplifted, often depressed, not striate, finely fibrillose, becoming fibrillose-scaly, hygrophanous, brownish orange, ("Vinaceous-Rufous" to "Kaiser Brown" to "Apricot Buff" or "Burnt Sienna" to "Sanford's Brown"), occasionally vinaceous color ("Vinaceous-Brown" or "Vinaceous-Russet" to "Japan Rose"); disc often darker, red brown to dark orange brown or occasionally vinaceous ("Dark Livid Brown" to "Deep Brownish Vinaceous" to "Hay's Russet" or "Chocolate" to "Vinaceous-Russet" or "Mahogany Red"); margin incurved to decurved, becoming plane to uplifted, entire to undulate, occasionally becoming eroded; context 1-2 mm thick, tapering quickly to margin, flesh color ("Pale Vinaceous-Pink"). Lamellae broad to very broad, thick to very thick, sinuate to adnate, occasionally arcuate, subdistant to distant, pinkish flesh color ("Vinaceous-Pink" to "Buff-Pink" or "Light Congo Pink" to "Shell Pink"), occasionally vinaceous or violaceous ("Light Brownish Vinaceous" to "Pale Brownish Vinaceous" or "Light Pinkish Lilac"). Stipe (11-)20-60(-65) x 2-12 mm, equal to subclavate, often slightly bulbous, dry, fibrillose, occasionally finely longitudinal-striate concolorous with pileus; striations occasionally darker ("Pecan Brown").

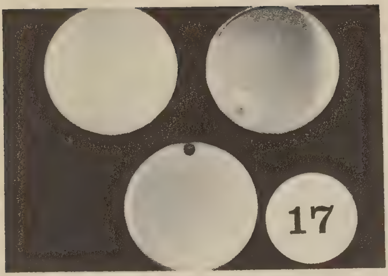


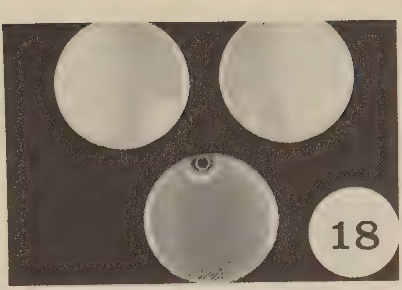
Figs. 14-16. Representative pileipelli. Fig. 14. L. trichodermophora (TENN 42523). Fig. 156. L. vinaceo-brunnea (TENN 42525). Fig. 16. L. oblongospora (TENN 42522). This type of pileipellus is also found in L. amethysteo-occidentalis and L. nobilis.

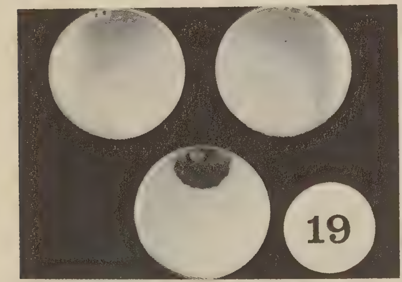
Basal mycelium usually white, occasionally violet. Spores white in mass.

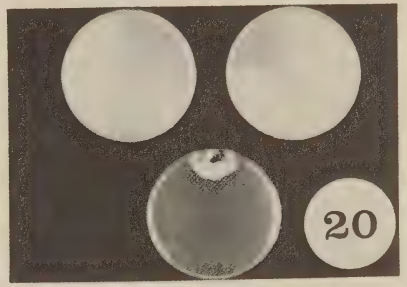
MICROMORPHOLOGY: PILEUS: Pileipellis loosely interwoven with scattered large fascicles of ± perpendicular hyphae; fascicles long, usually composed of (5-)10-30 or more hyphae; terminal cells of fascicular hyphae (n = 50) 32.5-71 x 7-24.5 µm, undifferentiated to subclavate to clavate, occasionally broadly clavate or capitate; walls up to 0.5 µm thick, light yellowish brown to light vinaceous; contents hyaline to light yellowish brown or light vinaceous. Trama tightly interwoven, undifferentiated, hyaline, moderate yellowish brown to light vinaceous toward cuticle. LAMELLA: Trama parallel; hyphae 3-10 µm diam, thin-walled, hyaline to light yellowish brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 53) 24-35 x 6.4-10 µm, clavate, elongate, hyaline; sterigmata 4, up to 5.5 µm long. Pleurocystidia lacking. Cheilocystidia (n = 20) 31.5-53 x 2.8-7 µm, undifferentiated to subclavate, found only in some collections, scattered, thin-walled, hyaline. Basidiospores (excluding ornamentation) [90/5] (6.8-)7.4-10 x (4-)5-7 µm (mean dimensions = 8.7 ± 0.7 x 5.8 ± 0.5 µm), L/W = (1.25-)1.3-1.76(-1.8) (mean L/W = 1.51 ± 0.12), ellipsoidal to oblong, occasionally subreniform, hyaline, echinulate; spines < 0.5(-1.4) µm long (mean length = 0.6 ± 0.1 µm), spines over 0.5 um long restricted to spore apex, crowded; hilar appendix 1.32-2 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acanophyllic. BASAL MYCELIUM: Hyphae mostly 2.8-11 µm diam, tightly interwoven, hyaline; cells long, undifferentiated to barrel-shaped.

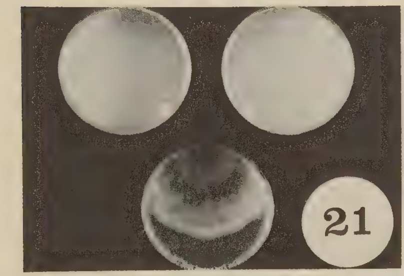
CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 5 isolates): PDA: Radius at week III = 28-39 mm, at week VI = 45-78 mm; mat felty, moderately thick to thick, tightly interwoven, with scattered small sectors of longer, loosely interwoven hyphae, submerged, on aging forming pruinose aerial layer away from plug, not translucent, at first dark violet, soon fading, by week III light to moderate violet restricted either to 2-3 mm band near margin or 4-5 mm zone near plug, most of mat light orange brown, by week VI all light orange brown, no violet coloration present; margin up to 5 mm broad, silky to subfelty, thin, uneven to very uneven, very light violet, becoming white; plug concolorous with mat. MNM: Radius at week III most 48-56 mm, one isolate 30-36 mm, at week VI most covering agar surface, one isolate 58-78 mm; mat subfelty to subwooly, very thin to thin, becoming thicker, loosely interwoven, some with subwooly to wooly or cottony narrow strands radiating out from plug to margin, between strands very thin, submerged, translucent, becoming somewhat translucent, at first light violet, soon fading to very light violet to white; margin not well differentiated, thin, uneven to very uneven, concolorous; plug concolorous. MA: Radius at week III = 26-40 mm, at week VI = 51-78 mm; mat subfelty, very thin to thin, loosely interwoven, some with 1-3 narrow slightly thicker concentric bands, submerged, translucent, white; margin 1-2 mm broad, not well differentiated, even to uneven, white; plug white. EXTRACELLULAR OXIDASE: Reaction in one isolate (TENN 42522) moderate blue color after 1 hr, all other negative.

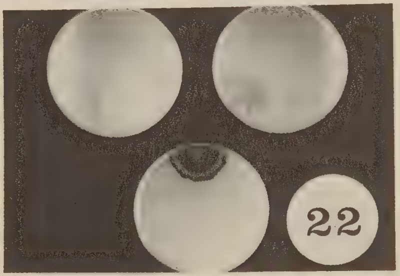


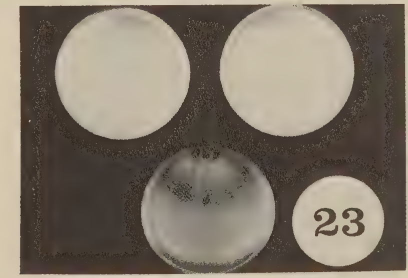












Figs. 17-24. Photographs of four-week-old vegetative culture mats. Fig. 17. *L. amethysteo-occidentalis* (TENN 42526). Fig. 18. *L. ochropurpurea* (TENN 42915). Fig. 19. *L. nobilis* (TENN 42893). Fig. 20. *L. laccata* (TENN 42961). Fig. 21. *L. oblongospora* (TENN 42672). Fig. 22. *L. proxima* (TENN 42920). Fig. 23. *L. trichodermophora* (TENN 42705).

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 5 isolates): PDA: *Hyphae* mostly undifferentiated with scattered irregular swollen hyphae and subcoralloid hyphae, occasionally coralloid hyphae present. MNM: *Hyphae* mostly undifferentiated with any combination of scattered, rare to moderately common irregular swollen hyphae, subcoralloid hyphae or coralloid hyphae. MA: *Hyphae* mostly undifferentiated with scattered irregular swollen hyphae and subcoralloid hyphae.

HABITAT AND DISTRIBUTION: Gregarious; in very sandy soil under *Pinus palustris* Miller; Gulf Coast. Number of collections examined per state: Mississippi 30.

OBSERVATIONS: *Laccaria oblongospora* often appears similar to other members of the "*L. laccata* complex" in the field, but it can readily be distinguished by its strongly ellipsoidal to oblong, short-spined basidiospores. The size, shape, and ornamentation of its basidiospores are most similar to those of *L. proxima* (Boud.) Pat. but are more elongate, mean L/W = 1.51 versus 1.27 for *L. proxima*. This difference was statistically significant based on a t-test between the mean basidiospore L/W of both taxa. Additionally, the two taxa have unique culture mat morphologies (Figs. 20, 21).

Basidiocarp color varies greatly in this taxon. Most specimens exhibited the typical orange brown coloration of *L. laccata sensu lato*. Scattered amongst these were a few individual fruitbodies which were vinaceous to violaceous (e.g., TENN 42524). Initially, these vinaceous collections were thought to represent a separate taxon. However, due to the occurrence of intermediate color forms (orange brown pilei and stipes with violaceous basal mycelium and/or lamellae) and the fact that both color forms showed identical micromorphology and culture mat morphology, they have been treated as contaxic.

Only two populations of this species have been located. Both populations were very large, occurred under long leaf pine, and were within several kilometers of each other.

Laccaria trichodermophora Mueller. *sp. nov.* Figs. 4, 9, 14, 23.

Pileo 9-66 mm lato, haud striato, aurantio-brunneo. Lamellis carneorosellis. Stipite 22-125 x 2-11 mm, striato, concolori; mycelio basali plerumque albo, interdum violaceo. Cuticula trichodermide vel abundis perpendicularibus fasciis hypharum. Basidiis tetrasporis. Cheilocystidiis nullis. Sporis plerumque 7.4-9.2 x 6.4-8.3 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42523; USA: Mississippi, Harrison Co., DeSoto National Forest, Harrison Experimental Forest, Road H-6. 5.XIII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: *Pileus* 9-66 mm broad, convex to to plane, occasionally becoming uplifted, often depressed, not striate, finely fibrillose, becoming fibrillose-scaly to scaly due to cuticular difraction, hygrophanous, brownish orange, occasionally reddish brown ("Hazel" to "Vinaceous-Rufous" or "Auburn" to "Orange Rufous" or "Cacao Brown"), fading lighter ("Flesh-Ocher" to "Apricot Buff"), occasionally darker at disc ("Hay's Russet" to "Kaiser Brown"); margin incurved to decurved, often becoming plane, entire to undulate, sometimes becoming eroded; context 1-2 mm thick, tapering quickly to margin, pinkish flesh color ("Light Congo Pink" to "Pale Vinaceous-Pink"). Lamellae moderately broad to broad, relatively thin to thick, sinuate to adnate, close to subdistant to distant, flesh color ("Vinaceous Pink" to "Shell Pink" or "Flesh Color" to "Pale Salmon Color"), sometimes become vinaceous in age (near "Vinaceous"). Stipe 22-125 x 2-11 mm, equal to subclavate, occasionally slightly bulbous, dry, fibrillose, inconspiciously to moderately longitudinally striate, brownish orange to reddish brown ("Rood's Brown" to "Onion-skin Pink" or "Kaiser Brown" to "Cinnamon-Rufous" to "Salmon Color"); context stuffed, becoming hollow, concolorous with pileus context. Basal mycelium usually white, occasionally violet (near "Lavender").

MICROMORPHOLOGY: PILEUS: Pileipellis composed of very numerous large fascicles of ± perpendicular hyphae, forming a trichodermium in young specimens and at the disc; fascicles long, usually composed of more than 30 hyphae; terminal cells (n = 60) 25.3-73.6 x 6-28 µm, undifferentiated to clavate, occasionally capitate; walls up to 0.5 µm thick, light to moderate yellowish brown; contents hyaline to light yellowish brown. Trama tightly interwoven, undifferentiated, hyaline, light yellowish brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 3.2-15 µm diam, thin-walled, hyaline to light yellowish brown; cells long, undifferentiated to barrel-shaped. Subhymenium undifferentiated. Basidia (n = 70) 25.8-46 x 7.4-12.4 µm, clavate, elongate, hyaline; sterigmata 4, up to 8.7 µm long. Pleurocystidia lacking. Cheilocystidia lacking. Basidiospores (excluding ornamentation) [90/6] (7-)7.4-9.2(-10.6) x 6.4-8.3(-9.2) µm (mean dimensions = 8.3±0.6 x 7.6 ± 0.5 µm), L/W = 1-1.18 (-1.33) (mean L/W = 1.09 ± 0.07), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, hyaline, echinulate; spines (0.5-)0.9-1.8 µm long (mean length = 1.3 ± 0.3 µm), irregularly spaced to crowded; hilar appendix 1.3-1.8 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 3.2-12 µm diam, tightly interwoven, hyaline; cells long, undifferentiated to barrel-shaped.

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 5 isolates): PDA: Radius at week III = 16-38 mm or 42-45 mm, at week VI = 29-48(-59) mm or covering agar surface; mat felty, moderately thick to thick, tightly interwoven, uniformly thick or with narrow thicker dendritic strands radiating out from plug, submerged, usually forming pruinose aerial layer away from plug, not translucent, very dark bright violet, fading to moderate violet, finally to light orange brown near plug; aerial hyphae light grayish violet; margin 5-6 mm broad, subfelty to felty or silky, thin to almost moderately thick, entire to very uneven, very light violet to white; plug very dark violet, soon becoming light orange brown. MNM: Radius at week III = 26-44 mm or 52-64 mm, at week VI = 54-78 mm or agar surface covered; mat subfelty becoming felty or silky, moderate to moderately thick or very thin, with 2-3 narrow (2-3 mm) slightly thicker concentric zones or with slightly thicker radially arranged dendritic strands from midpoint to margin or uniformly thin, submerged, translucent to slightly translucent, very light violet, thicker zones somewhat darker; margin not well differentiated from mat, silky to subfelty, sinuate, very light violet to white; plug concolorous with mat. MA: Radius at week III = 20-26 mm or 35-42 mm, at week VI = 38 mm to agar surface covered; mat subfelty, very thin or moderate, occasionally thicker near plug, loosely or moderately interwoven, submerged, translucent or somewhat translucent, white; margin not well differentiated from mat, silky to subfelty, entire to sulcate, white; plug white. EXTRACELLULAR

OXIDASE: Reaction normally a moderate blue color immediately, negative in TENN 42523.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 5 isolates): PDA: Hyphae mostly undifferentiated with occasional subcoralloid hyphae and irregular swollen hyphae. MNM: Hyphae same as on PDA. MA: Hyphae mostly undifferentiated occasionally with scattered irregular swollen hyphae.

HABITAT AND DISTRIBUTION: Scattered to gregarious; in very sandy soil, under Pinus palustris; Gulf Coast. Number of collections examined per state: Alabama 1; Louisiana 4; Mississippi 23.

OBSERVATIONS: Laccaria trichodermophora can be distinguished from L. laccata by its pileipellis composed of a trichoderm of numerous large hyphal fascicles, relatively small, subglobose to broadly ellipsoidal, moderately spined basidiospores, larger, more robust basidiocarps, and unique culture mat (Figs. 20, 23).

Although similar in overall culture mat morphology, isolate TENN 42705 grew at a much faster rate than the other four isolates used. Since there was no apparent basidiocarp morphology differences between it and other collections of the species, it is considered contaxic. Similarly, even though the basidiocarps of TENN 42706 had violet basal mycelium, no significant differences in its micromorphology or culture mat could be discerned.

Laccaria vinaceo-brunnea Mueller. sp. nov. Figs. 5, 10, 13, 15.

Pileo 7-25(-42) mm lato, violaceo in statu juvenili, paulatim vinaceobrunneo dein rufrobrunneo, siccando pallidiore. Lamellis purpureo-violaceis. Stipite 7-56(-98) x 2-7 mm, haud fortiter striato, concolori. Cuticula abundis grandibus perpendicularibus hyphis intertexta. Basidiis tetrasporis. Cheilocystidiis grandibus, abundis. Sporis plerumque 7.4-10 x 6.4-9.2 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis curtis vel moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42525; USA: Louisiana, Tammany Parish, Fountainbleau State Park, under Quercus virginiana Miller. 9.XII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus 7-25(-42) mm broad, obtuse to convex, becoming plane to uplifted, often depressed, not striate or occasionally finely striate when wet, finely fibrillose, occasionally becoming finely fibrillose-scaly, hygrophanous, when very young violaceous (near "Purplish Lilac"), soon becoming vinaceous brown ("Dark Vinaceous Brown" to "Hay's Brown" to "Vinaceous-Brown"), becoming reddish brown ("Cameo Brown" to "Walnut-Brown"), fading to near orange brown to buff ("Cinnamon-Rufous" to "Light Ochraceous-Buff"); margin decurved to plane, entire to eroded; context thin, tapering to margin, light vinaceous ("Light Brownish Vinaceous" to near "Vinaceous-Fawn"). Lamellae moderately broad to very broad, thick to very thick, waxy, adnate to arcuate, subdistant to distant, purple ("Purplish Lilac" to "Purplish Vinaceous"). Stipe 7-56(-98) x 2-7 mm, equal or occasionally subclavate, often slightly bulbous, dry, fibrillose, occasionally with recurved fibers or finely striate, concolorous with pileus; fibers ("Hazel" to "Vinaceous-Brown"). Basal mycelium violet. Spores white in mass.

MICROMORPHOLOGY: PILEUS: *Pileipellis* interwoven with very numerous ± perpendicular individual large hyphae, almost forming a palisadoderm but hyphae not dense enough; terminal cells (n = 30) 32-78 x 7-14.5 µm, undifferentiated to clavate, hyaline to light vinaceous; walls up to 0.5 µm thick; contents hyaline. *Trama* tightly interwoven, undiffereniated, hyaline to light olive brown in mass. LAMELLA: *Trama* parallel; hyphae thin-walled, hyaline; cells long, barrel-shaped. *Subhymenium* undifferentiated. *Basidia* (n = 30) 33-60 x 8.5-9.2 µm, clavate, elongate, hyaline; sterigmata 4, up to 9.2 µm long. *Pleurocystidia* lacking. *Cheilocystidia* (n ± 32) 31.5-92 x 5.5-11 µm, undifferentiated to clavate, very abundant, extending well beyond basidia, hyaline. *Basidiospores* (excluding ornamentation) [60/4] (7)-7.4-10(-10.6) x 6.4-9.2(-9.7) µm (mean dimensions = 8.7±0.8 x 7.8±0.7 µm), L/W = 1-1.26 (mean L/W = 1.11±0.06), subglobose to broadly ellipsoidal, occasionally globose, hyaline, echinulate; spines <0.5-1.4(-1.8) µm long (mean length = 1±0.3 µm), crowded; hilar appendix 1.3-1.8 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: *Hyphae* mostly 2.8-8.2 µm diam, tightly interwoven, long-celled, hyaline.

HABITAT AND DISTRIBUTION: Scattered to gregarious, often caespitose; in sandy soil under *Quercus virginiana*; Gulf Coast. Number of collections examined per state: Louisiana 19; Mississippi 4.

OBSERVATIONS: *Laccaria vinaceo-brunnea* can be distinguished from *L. amethystina* and *L. amethysteo-occidentalis* by its habitat (almost exclusively under Live Oak), color (quickly becoming dark vinaceous brown to reddish brown), unique pileipellar arrangement, and short-spined, subglobose to broadly ellipsoidal basidiospores. As in the latter two species, the abundant large cheilocystidia often make a reliable character to use in identifying dry collections which lack notes on macromorphology. Although several attempts to obtain tissue cultures of this species were made, none were successful.

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MYCOTAXON

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Cookeina indica, a new species from India with a key to the species of *Cookeina*

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The purpose of this brief note is to describe a species of *Cookeina* which has heretofore not been recognized. Of the tropical species of the Pezizales, few are so frequently encountered as are species of *Cookeina*. The large apothecia of these species and their often prominent coloration assure that collectors take notice. In certain habitats, where twigs and branches accummulate, members of the genus may be found in great profusion.

To date, five species have been recognized in the genus. These species are morphologically distinct and are easily delimited. Denison (1967), Rifai (1968), and Eckblad (1968) have treated them. Pfister (1978) provided some observations on apothecial development in the pantropical *C. tricholoma*, and Zoberi (1973) discussed the influence of water on spore release in *C. sulcipes*, another pantropical species.

In the course of studying distributional ranges of the species of *Cookeina*, the senior author, some time ago, located a specimen at BPI which seemed to represent an undescribed species. The specimen, from India, was poorly preserved and fragmentary. Recently, the junior author collected material which he recognized as being unlike described species of *Cookeina*. This collection proved to be the same as the BPI material and allowed description.

Cookeina indica Pfister et Kaushal, sp. nov.

Apothecia grandia, usque 3 cm diam, stipitata cupulata, coriacea; stipites usque 2.2 cm x 1.5 mm. Hymenia lutea, laevia; pars exterior concolorans. Asci cylindracei, octospori 300-370 x 14-16 µm; ascosporae ellipsoideae, asymmetricae, guttulatae, primum laeves, denique minute striatae, 26.5-34.2 x 10-11.5 µm. Paraphyses anastomosantes 4.5 µm diam.

In ramunculi emortui.

Holotypus: on wood in an angiospermous forest, Tipi, West Kameng, Arunachal Pradesh, India (alt. 300 m), Sept. 16, 1981, col. Rishi Kaushal (#18611) (FH), (isotype PAN).

Other specimens examined: on *Dalbergia* sp., Dehra Dun, India, Sept. 2, 1952 (BPI).

Apothecia stipitate, cupulate, up to 3.5 cm high and up to 3 cm in diameter, gregarious, tough in consistency; stalk up to 2.2 cm long and up to 1.5 mm thick; solid, terete; external surface of the disc concolorous with the hymenium, nearly smooth except at the margin where it is minutely furfuraceous. Margin entire. Hymenium yellow, smooth. Asci 300-370 x 14-16 µm, 8-spored, long cylindrical, base narrow-hyphoid, thick-walled, apices obtuse, J-. Ascospores 26.5-34.2 x 10-11.5 µm; ellipsoid, 3-guttulate or multiguttulate, often inequilateral, with thickened walls at the poles of the spores, ornamentation of fine longitudinal ridges which sometimes anastomose, branching more oftenly at the apex, sometimes swollen up to 4.5 µm, slightly projecting beyond the ascus tips.

Outer excipulum up to 44 µm thick, textura angularis, cells up to 25 x 14.5 (-21.5) µm: medullary excipulum up to 160 µm thick, of interwoven hyphae somewhat parallel in arrangement at the junction between layers. Hairs arising from the outer excipulum and reaching a length of 80 µm.

Holotype: on wood in an angiospermous forest, Tipi, West Kameng, Arunachal Pradesh, India (alt. 300 m.). Sept. 16, 1981, Rishi Kaushal (#18611) FH (isotype PAN).

Other specimen examined: on *Dalbergia* sp., Dehra Dun, India, Sept. 2, 1952 (BPI).

Comments--*Cookeina indica* is distinct, having striate spores, a yellow hymenial surface and a non-hairy, nearly smooth outer surface. It seems quite limited in distribution. In the genus *Cookeina* the distributional patterns are of interest. Two species, *C. sulcipes* and *C. tricholoma*, are cosmopolitan. The remainder of the species are more limited in range. *C. venezuelae* has been reported from Jamaica and the northern part of South America. *C. colensoi*, on the other hand, has been reported from northern and central South America and from southern pacific areas. *C. insititia*, treated by some authors in the genus *Boedijnopeziza*, is found in the Pacific basin and *C. indica* seems limited to the Indian subcontinent. As more becomes known of the genus and the modes of speciation in it, these patterns may become important.

For convenience, a key to species is provided below.

Key to species of *Cookeina*

1. Apothecia with distinct hairs, stipitate 2
1. Apothecia smooth or at least without long prominent hairs, sessile, substipitate or stipitate, with or without gelatinous material in the excipular tissues 4
    2. Hairs broad, pyramidal; ascospores smooth, fusoid to more or less allantoid, with a single spore wall, 38-48 x 8-10 µm. Apothecia with a gelatinous layer within the cortical region . . . . *C. insititia* (Berk. & Curt.) O. Kuntze
    2. Hairs slender, ascospores ornamented with longitudinal striations. Apothecia non-gelatinous. . . 3
3. Hairs arising from the medullary tissue, more or less evenly spaced on the outside of the apothecium; paraphyses slender, exceeding the asci only slightly, ascospores marked with longitudinal ridges, 25-31 x 12-14 µm . . . . *C. tricholoma* (Mont.) O. Kuntze
3. Hairs arising from the outer excipulum, formed in rows at the margin of the disc; paraphyses sometimes setose, exceeding the asci; ascospores longitudinally striate, 25-30 x 13-16 µm . . . . *C. sulcipes* (Berk.) O. Kuntze
    4. Ascospores ornamented with longitudinal striations or with a combination of longitudinal and transverse folds .5
    4. Ascospores smooth, 28-36 x 9-12 µm, apothecia sessile or with a short stipe, with a gelatinous layer in the inner cortical region . . . . *C. colensoi* (Berk.) Seaver
5. Ascospores with longitudinal and transverse markings, 32-37 x 11-14 µm; inner cortical layer gelatinous; apothecia sessile . . . .*C. venezuelae* (Berk. & Curt. in Cooke) Le Gal
5. Ascospores with fine longitudinal markings only; 26.5-34.2 x 10-11.5 µm; gelatinous layer lacking or at least not well-formed; stipe well-developed . . . . *C. indica* Pfister & R. Kaushal

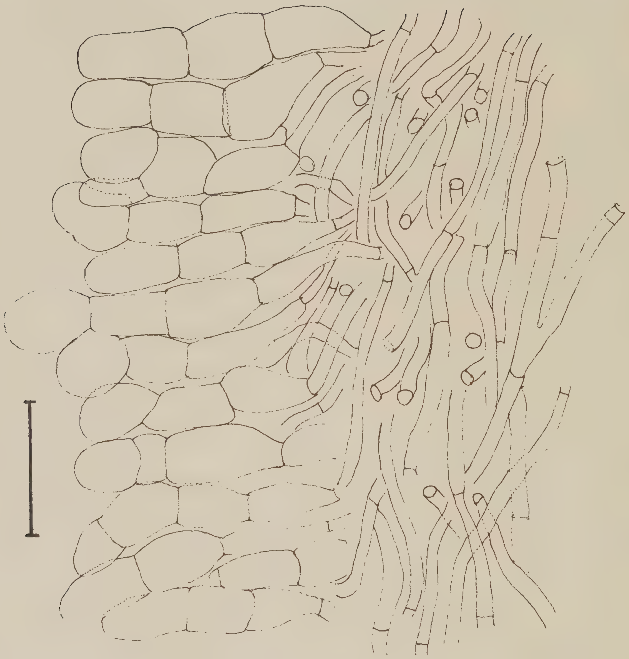

Figure 1. A portion of the outer excipulum of *Cookeina indica*. Scale equals 20 µm.

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GLOMUS DESERTICOLA SP. NOV.

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GLOMUS DESERTICOLA Trappe, Bloss & Menge, sp. nov. Figs. 1-6

Sporae singulatim vel in fasciculis laxis in solo vel in radices efformatae, globosae vel subglobosae, (47-)54-115 x (38-)52-102 µm, nitide-laeves, hepaticae, tunica singula (1.5-)2-2.5(-4) µm incrassata. Hypha affixa 6-12 µm in diam., tunica prope sporam incrassata sed hypham non occludens, hepatica. Tunica sporae interius ad afficionem hyphalem colliformane incrassata.

Spores borne singly or in loose fascicles in soil or within roots, globose to subglobose, (47-)54-115 x (38-)52-102 µm, shiny-smooth, reddish brown, with a single, sometimes laminated wall (1.5-)2-2.5(-4) µm thick. Attached hypha 6-12 µm in diam., cylindric to occasionally somewhat funnel shaped, the walls thickened and reddish brown, especially thick adjacent to the spore but not occluding the hypha. Interior of the spore wall at the hyphal attachment thickened at maturity to form an inner mounded collar, which appears to be closed by a membranous septum.

DISTRIBUTION AND HABITAT: Southern California, Arizona, and Texas, in sandy desert soils.

MYCORRHIZAL ASSOCIATIONS: Occuring among mycorrhizae of *Parthenium argentatum* A. Gray, *P. incanum* H.B.K., and *Simmondsia chinensis* (Link) Schneid. in the field; forms mycorrhizae and sporulates in pot culture with *Sorghum sudanense* (Pip.) Staff.

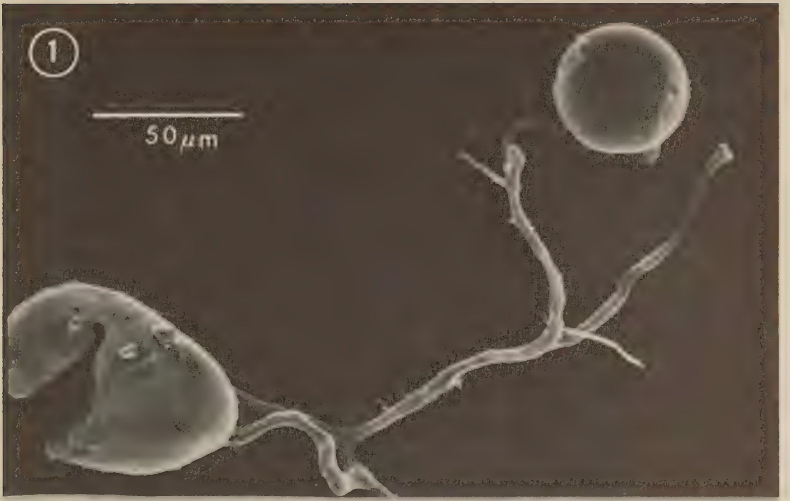
ETYMOLOGY: Latin, *deserticola* (desert dweller). The gender of the generic name *Glomus* is neuter, so adjectival species epithets must also be neuter. The suffix "-*cola*" is a feminine substantive, not an adjective, and thus retains its feminine ending.

COLLECTIONS EXAMINED: TYPE: CALIFORNIA, Riverside Co., Thermal, Willits and Newcomb property, Menge O-1#25(OSC). PARATYPES: ARIZONA: Pima Co., Tucson Mountains, Gates Pass, elev. 1,040 m, col. H. E. Bloss, 5 July 1978, Trappe # 5477, 7201(OSC); Pot cultured with *Sorghum sudanese*, H. E. Bloss, 1979, Trappe #7200(OSC). TEXAS: Brewster Co., 48 km South of Alpine, pot cultured with *S. sudanese* for 65 days, col. Judy Blackwell, Trappe #7453(OSC).

The walls of occasional *G. deserticola* spores appear to have either a very thin outer layer or a similarly thin inner layer. Because these structures are not evident on all or even most spores, we regard them as laminations or artifacts due to light refraction. The collar on the inner spore wall at the hyphal attachment is well developed only on quite mature spores. Only then could the membranous septal closure of the hyphal attachment be seen on some spores. On most spores at that stage, interference from adjacent spore walls prevented a clear view with the light microscope. Transmission-electron microscopy is needed to clarify the details of such structures.

FIGURES 1-3. *Glomus deserticola*

(1) Scanning electron micrograph of two chlamydospores and connective hyphae.
(2) Mature broken chlamydospore, light micrograph.
(3) Light micrograph showing several chlamydospores and hyphae.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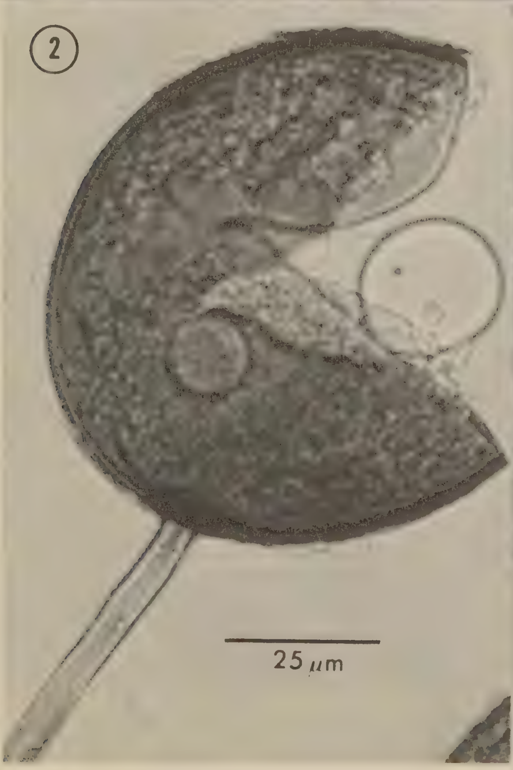
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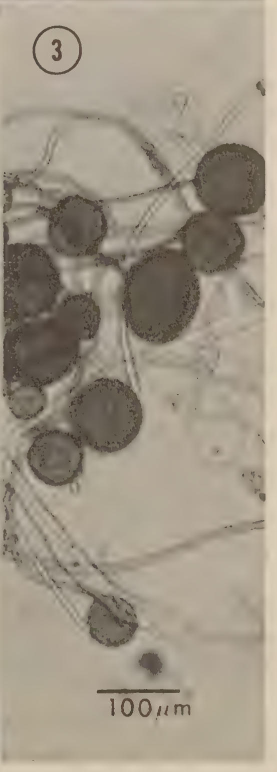
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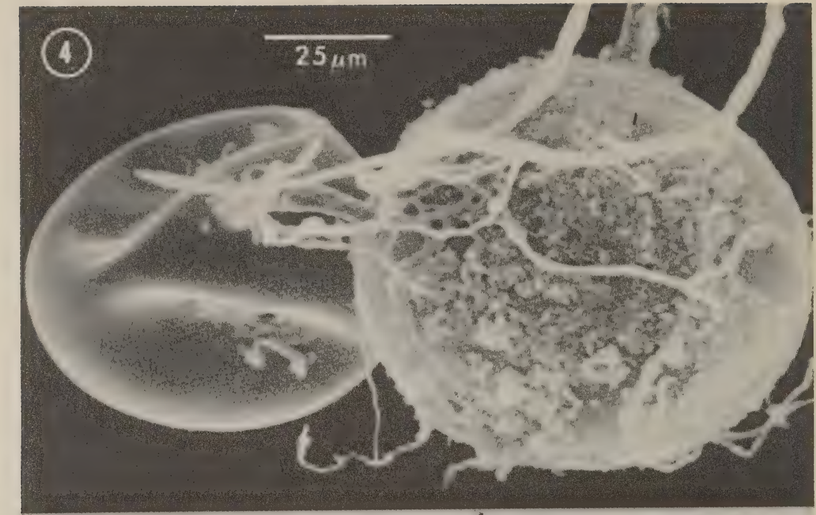

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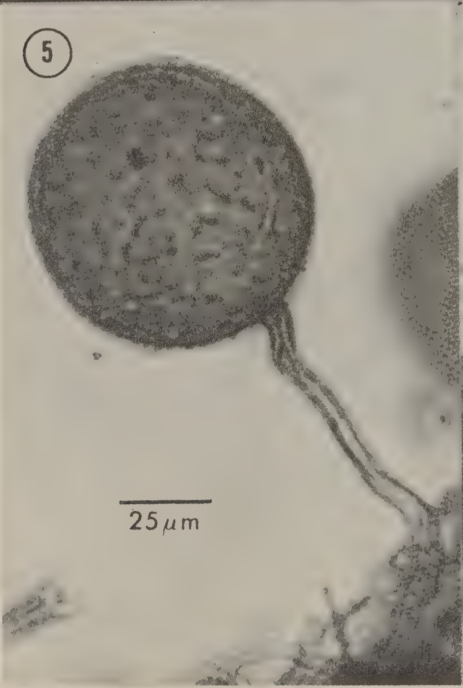

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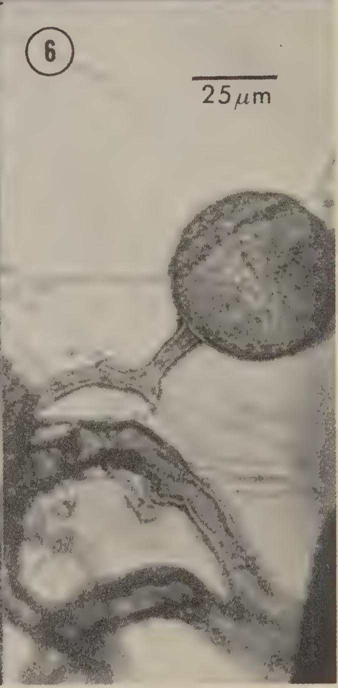

⑥

G. deserticola encompasses the general size range of *Glomus fasciculatum*, from which it differs by having deep reddish brown walls ±2 µm at maturity (vs. yellowish brown walls 5-10 or more µm thick), a relatively narrow, reddish brown hyphal attachment not occluded by wall thickening (vs. a broad, hyaline to yellowish brown hyphal attachment occluded by wall thickening at maturity), and apparently a closure of the attached hypha by a septum. Until now, *G. deserticola* has been grouped with other variants under the name *G. fasciculatum sensu lato*; the type collection of *G. deserticola*, Menge #0-1, is from a pot culture that has been widely distributed to mycorrhiza researchers as "*G. fasciculatum*." References to "*G. fasciculatum* 0-1" should thus be corrected to "*G. deserticola* 0-1."

FIGURES 4-6. *Glomus deserticola*

- (4) Scanning electron micrograph showing two chlamydospores and hyphae.
- (5) Light micrograph of mature chlamydospore with hypha attached.
- (6) Immature chlamydospore, light micrograph.

MYCOTAXON

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SOME HYPHOMYCETES WITH THALLIC CONIDIA

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Trichothecium cinnamomeum Lib. is reclassified in *Malbranchea*. It has differentiated fertile hyphae and yellow ochre pigmentation. *Arthropsis cirrhata* sp. nov. differs from the species known to date mainly by exuding a vivid orange pigment and forming arcuate lateral branches.

In the course of a revision of *Geotrichum* by the second author, several interesting species with thallic conidia were encountered. The type collection of *Trichothecium cinnamomeum* Lib. was well preserved in the Brussels Herbarium. It was found to be a *Malbranchea* species not included in the revision of the genus by Sigler & Carmichael (1976), and is therefore described below.

Malbranchea cinnamomea (Lib.) van Oorschot & de Hoog, *comb. nov.* -- Fig. 1

Trichothecium cinnamomeum Lib. -- Pl. crypt. Arduenna, Coll. I, Nr. 1013. 1830 (basionym) = *Geotrichum cinnamomeum* (Lib.) Sacc. -- Revue mycol. 1881: 55; Michelia 2: 636. 1882; Syll. Fung. 4: 40. 1886.

Colonies on the natural substrate forming patches of irregular shape, up to 4 mm diam, yellow ochre (Methuen 5C7), even, powdery. Hyphae yellowish brown, with firm, thick and smooth walls, 2.5-3.5 um wide, remotely septate, branched more or less orthotropically from repent hyphae, mostly somewhat curved, occasionally branched, soon converted into chains of arthroconidia which disarticulate easily, leaving a prominent scar on the supporting hypha. Conidia yellowish brown, with firm walls, usually intercalary, adjacent or alternate and connected by hyaline, thin-walled and fragile cells which soon collapse and deteriorate. Conidia cubic to cylindrical sometimes curved, 3-6 x 2.4-3.5 um, with conspicuous frills at both ends.

Specimens examined: Libert, Pl. crypt. Arduenna, Coll. I No. 1013 (Herb. BR), type specimen, on horse dung with straw, Belgium, M.A. Libert; Sydow, Mycoth. Germ. No. 1744 (Herb. L 922.54-67) on rotten hay, Tamsel, Brandenburg, Germany, leg. P. Vogel, 15 Sept. 1920.

Discussion

The above species is distinguished from other species described in *Malbranchea* Sacc. in that the primary hyphae are pigmented and fertile branches appear to be little-branched. *M. cinnamomea* is most like *M. aurantiaca* Sigler & Carmichael in colour, the curved fertile hyphae and the conidium size and shape. The arthroconidia of *M. aurantiaca* are more regularly alternate.

The genus *Coremiella* Bubak & Krieger also has catenate arthroconidia and pigmented hyphae, but here hyphae are wider (up to 7 µm), often dichotomously branched and aggregated in loose coremia. Arthroconidia of *Coremiella* are directly adjacent and show a protruding scar or papilla at each end (Sigler & Carmichael, 1976).

Arthropsis cirrhata van Oorschot & de Hoog, *sp. nov.* -- Fig. 2

Coloniae in agaro 25°C ad 4-5 mm diam. post 10 dies, pulverulentae, coactae, modice elevatae, aurantiae, in medio dilute aurantiae; reversum aurantiobrunneum, pigmento exsudato brunneo circumdatum. Hyphae fertiles a hyphis vegetativis haud distinctae, dilute luteo-aurantiae, 2-3 µm latae, primariae dichotomae, ramos laterales saepe recurvatos rectangulariter formantes; septis densis in successione basipetali divisae conidia enterarthrica producunt; arthroconidia dilute luteo-aurantia, levia, cylindrica vel cuboidea, saepe latiora quam longa, utrinque truncata, 2.5-4.0 x 2-3 µm, connectivis trapezoideis separata,post liberationem vestigia parietis exterioris ferentia.
Typus CBS 628.83, vivus et exsiccatus, isolatus e pariete prope Schiphol in Neerlandia.

Colonies on PYE at 25°C restricted, attaining 4-5 mm diam in 10 days, powdery, felty, slightly raised, orange (Methuen 5A7), light orange (5A5) at the centre; reverse brownish orange (7C8), exuding a faint brown pigment into the medium. Hyphae pale yellowish orange, 2-3 µm wide, main branches dichotomously branched, with often recurved lateral branches arising at right angles, septating basipetally to form enteroarthric conidia. Conidiophores not differentiated. Arthroconidia light yellowish orange, smooth-walled, cylindrical or cubic, often broader than long, truncate at both ends, showing remnants of outer walls at liberation, separated by trapezioid connectives, 2.5-4.0 x 2-3 µm. Growth temperatures: optimum 25-30°C, maximum 30°C.

Discussion

Sigler & Carmichael in a series of publications (1976, 1983; Sigler et al., 1982) greatly expanded the knowledge of the Hyphomycetes with cubic arthroconidia. As to the relationship of the genus *Arthrographis* Cochet, they (Sigler & Carmichael, 1983) stated that the taxonomy is still somewhat unsatisfactory. Major generic criteria in this group are the presence of intercalary cells or disjunctors between conidia, the differentiation of fertile branches,and the intensity of pigmentation.

Arthrographis was conceived as hyaline and schizolytic, without disjunctors, while *Arthropsis* Sigler et al. was dematiaceous with disjunctors present between conidia. The generic type, *A. truncata*, is dimorphic, a dematiaceous *Humicola* anamorph being produced in addition to hyaline, cubic arthroconidia However, the differences between the various conidial anamorphs are rather difficult to ascertain. In the type specimen of *Arthropsis microsperma* (Berk. & Br.) Sigler, connectives sometimes seemed to be absent. We consider *A. microsperma* as closely related to *Arthrographis cuboidea* (Sacc. & Ell.) Sigler, the differences in conidiogenesis hardly warranting classification

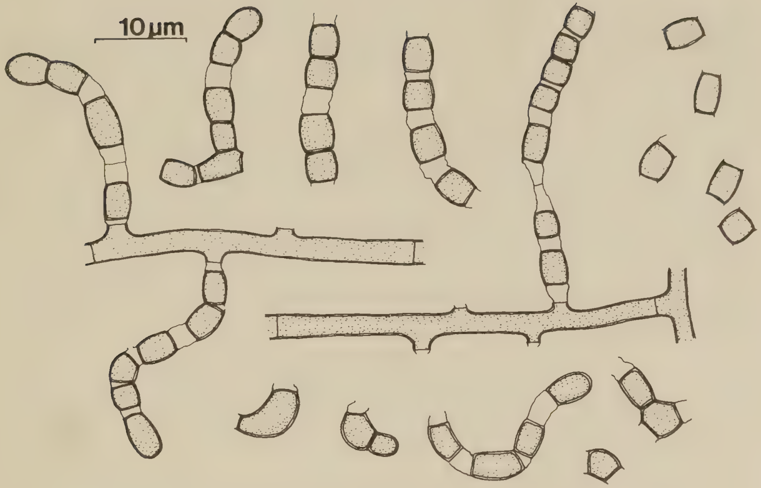

Fig. 1. *Malbranchea cinnamomea*, type specimen (BR).

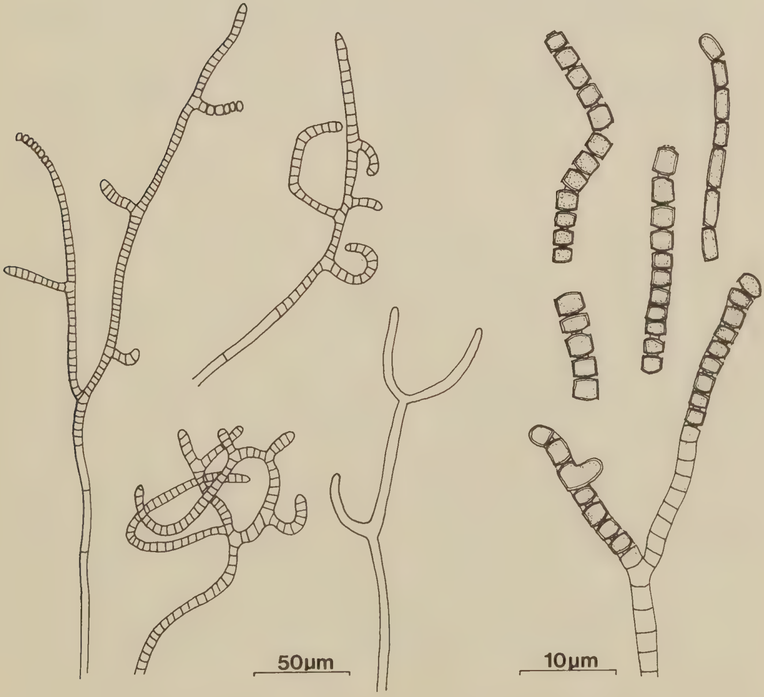

Fig. 2. *Arthropsis cirrhata*, type strain CBS 628.83.

in separate genera. Besides it is uncertain whether the structure of connectives is comparable in all species. For the moment we believe that *Arthropsi* might be a useful genus for all species now known in *Arthrographis*, except the generic type, all being characterized by specialized arthroconidial hyphae and cubic arthroconidia. The anamorph of *Byssoascus striatisporus* (Barron & Booth) v. Arx also fits this genus. The type species of *Arthrographis*, *A. sulfurea* (Grev.:Fr.) Stalpers & van Oorschot (in Stalpers, 1984), is different from *Arthropsis* in that the conidial structures are unspecialised and additional globose aleurioconidia are present. More material should be collected and TEM studies carried out in anticipation of any nomenclatural changes in this group.

A further synonym of *A. cuboidea* may be *Geotrichum candidum* Link var *thermoideum* Qureshi & Mirza (1981). However, the type specimen was not sent upon request, and in the diagnosis no attention was paid to the presenc or absence of connectives.

The name of the type species of *Arthrographis* was recently changed in Stalpers's (1984) monograph of *Sporotrichum* Link:Fr. Full synonymy now runs as follows:

Arthrographis sulfurea (Grev.:Fr.) Stalpers & v. Oorschot

Sporotrichum sulfureum Grev. -- Mem. Werner. Soc. 4: 69. 1822; Scott. Crypt. Fl. 2: 108. 1823 = *Sporotrichum sulfureum* Grev.:Fr. -- Syst. Mycol 3: 423. 1832 = *Arthrographis sulfurea* (Grev.:Fr.) Stalpers & van Oorschot in Stalpers -- Stud. Mycol. 24: 87. 1984.

Oospora cuboidea Sacc. & Ell. -- Michelia 2: 576. 1882 = *Geotrichum cuboideum* (Sacc. & Ell.) Sumstine -- Mycologia 5: 56. 1913 = *Coremiella cuboidea* (Sacc. & Ell.) Cif. & Caretta -- Mycopath. Mycol. appl. 12: 249. 1960.

Oospora sulfurea Sacc.& Roum. -- Michelia 2: 637. 1882 (non *Oospora sulfurea* (Preuss) Sacc. & Vogl. -- Syll. Fung. 4: 21. 1886) = *Oospora sulphurella* Sacc. & Roum. -- Syll. Fung. 4: 21. 1886 (name change).

Geotrichum microsporum G. Smith -- Trans. Br. mycol. Soc. 45: 388. 1962 = *Briosia microspora* (G. Smith) v. Arx -- Antonie van Leeuwenhoek 38: 293. 1972.

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MYCOTAXON

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SOME NEW AND NOTEWORTHY BASIDIOMYCETES (APHYLLOPHORALES) FROM NEPAL.

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SUMMARY

90 species of Aphyllophorales are reported from Nepal for the first time. Peniohora bicornis, Phlebia albo-fibrillosa, Schizopora roseotingens, Phellinus acontextus, Inonotus hamusetulus and Grammothele bambusicola are described as new. The following new combinations are proposed: Hypochnicium longicystidiosum (Rattan) Hjort. & Ryv., Inonotus flavidus (Berk.) Ryv. and Daedalea incana (Lév.) Ryv.

The mycoflora of Nepal is poorly known. The main contributions include Balfour-Browne (1955 & 1968) and Ryvarden (1977),with additional scattered information in Rattan (1977). In 1979 one of us (L.R.) led a trek to Annapurna in Western Nepal. Although conditions were relatively unsuitable for collecting with walking every day and living in a small tent for 3 weeks, some 490 collections were gathered. The following is a list of species not previously reported from Nepal. The species are arranged by families and within each family alphabetically according to genus. For each species one or several collection numbers are cited behind the name and this, taken in connection with the following list of localities, should give the necessary information. All collections are deposited in the Oslo University Herbarium (O).

List of localities, all in Gandaki prov. Nepal 1979.
Coll. 18500-18527: Pokhara, 1200 m. 27. Oct. 1979.
Coll. 18528-18604: Khare, 1500 m, 28. Oct. 1979.
Coll. 18611-18759: Ghorapani, 2600 m. 30. Oct. 1979.
Coll. 18760-18796: Chomro, Annapurna, 2000 m, 3. Nov.
Coll. 18797-18823: Hinko, Annapurna, 2400 m, 4. Nov.

Coll. 18824-18867: Annapurna base camp. 3800 m, 5. Nov.
Coll. 18868-18990: Kuldi, Annapurna, 2400 m, 11. Nov.

CORTICIACEAE.

Aleurodiscus aff. *bertii* Lloyd. 18848, 18849.
Two, fairly small specimens probably belonging to this group of species (compare Lemke, 1964) but which differ from the above species by the larger acanthophyses and softer fructifications. The spores are smooth, distinctly amyloid but do not swell fully in KOH and Melzer's reagent.

Asterostroma muscicolum (Berk. & Curt.) Massee. 18538/B, 18695. Determined with some doubt as the spores are only found as amyloid fragments in a crush-preparation.

Athelia epiphylla Pers. 18670, 18770, 18805, 18814, 18896, 18964. Variable in the size of the spores and basidia.

Cerinomyces crustulinus (Bourd.& Galz.) Martin. 18922.

C. pallidus Martin. 18670B. The species has apparently not been reported from Asia before.

Conferticium ochraceum (Fr.) Hallenb. 18673, 18705.
This genus is a segregate of *Gloeocystidiellum* and separated mainly by the stratified fruitbody and that the basidia have linear repetition. The specimens were collected on *Abies*.

Cylindrobasidium evolvens (Fr.) Jülich. var. *cucullatum* 18616/B. (Bourd. & Galz.) Hjortst. & Ryv. comb. nov.
Basionym: Corticium laeve Pers f. cucullata Bourd. & Galz., Hym. de France, p. 184, 1928.-
This unusual small variety of *C. evolvens* is worthily of attention. It has microscopical characters similar to the typical resupinate form, but the cupulate fruitbody is very distinctive.
Specimens seen: 18625, and in addition one from USA. Minnesota: Clearwater Co., Itasca State Park, Itasca Lake, 1977-09-16, Ryvarden 14382 (O).

Cystostereum aff. stratosum Hallenb. 18935.
According to the original description and also verbal communication from Hallenberg the textura of *C. stratosum* has a characteristic honeycomb pattern and the cystidia are filled with yellowish contents, which is not the case in the material from Nepal. In other characteristics e.g. colour and stratification of the fruitbody, size of the spores they are very similar.

Dacryobolus sudans (Fr.) Fr. 18928, 18990.
The aculei are much longer than in specimens from the northern temperate zone, often up to 1.5-2 mm long. This morphological variation has also been observed in collections from East Africa.

Dendrothele aff. *commixta* (Höhn. & Litsch.) Erikss. & Ryv. 18576, 18578. Two collections apparently belong here. Cystidial organs are lacking, but dendrohyphidia are present. Basidia longer than normal, about 50 x 5 um, usually with four sterigmata. Spores indistinctly thick-walled, non-amyloid, 12 x 8 um.

Dentipellis fragilis (Fr.) Donk. 18729.

Dichostereum pallescens (Schw.) Boid. & Lanquet. 18916, 18939. Two specimens have been examined. Number 18939 is typical D. pallescens in having yellowish to pale brown dichohyphidia (KOH), 7-8 um wide spores, and a pale brown fruitbody. The specimen has been compared with material in the Göteborg herbarium (e.g. Burdsall 9538). No 18916 has similar spores but the dichohyphidia are fewer and hyaline. According to the key in Boidin and Lanquetin (1980) this specimen is apparently close to D. rhodosporum (Wakef.) Boid. & Lanq.

The geographical distribution of the two species (see Boid. & Lanquet. 1980) is different. D. pallescens is known from North America (but compare Parmasto 1970), where it is more or less common, at least in the south, where as D. rhodosporum is known only from Australia. Balfour-Browne (1968) reported the latter species from Nepal but her spore-measurements seem to be too small (5-6 um wide). We have also examined another specimen from Nepal (Poelt, 1968, in GB) also determined Vararia pallescens, but no spores were found and the dichohyphidia were very few.

Fibricium rude (Karst.) Jülich. 18796/B.

Fibrodontia gossypina Parm. 18784.

Gloeocystidiellum lactescens (Berk.) Boid. 18519. Recently transferred to Megalocystidium by Jülich together with G. luridum and G. leucoxanthum (type species). Evidently this species has little in common with the other two. It lacks clamps and the spores are weakly amyloid and is morphologically quite different from all other species formerly placed in Gloeocystidiellum. In micro-morphology G. irpicescens Boid. is extremely similar but has odontioid fruitbody.

G. lactescens is cosmopolitan in its distribution. We have seen specimens from Europe, Asia, Africa, South and North America, from both northern conifer regions as well as from subtropical forests.

Haplotrichum conspersum (Pers.) Hol.-Jech. 18644, 18945. The teleomorph is lacking in the specimens.

Hyphodermella corrugata (Fr.) Erikss. & Ryv. 18929.

Hyphodontia lanata Burds. & Nakas. 18918/B. This recently described species is macroscopically somewhat similar to H. breviseta, although well separated by its smaller aculei (about 5/mm) and a more yellow colour. The spores are smaller than those of H. breviseta and subcylindrical. This is the first report outside the type-locality. The type-specimen has been studied (H.H.B. 8925, WIS).

H. propinqua Hjortst. 18746, 18782, 18766, 18779.

H. sambuci (Pers.) John Erikss. 18507.

Hypochnicium detriticum (Bourd. & Galz.) Erikss. & Ryv. 18815. Strongly grandinioid. Cystidia rare.

Hypochnicium longicystidiosum (Rattan) Hjortst. Fig.1. & Ryv. comb. nov. Basionym: Hyphodontia longicystidiosa Rattan, Biblioth. Mycol. 60:340, 1977. Holotypus: India.

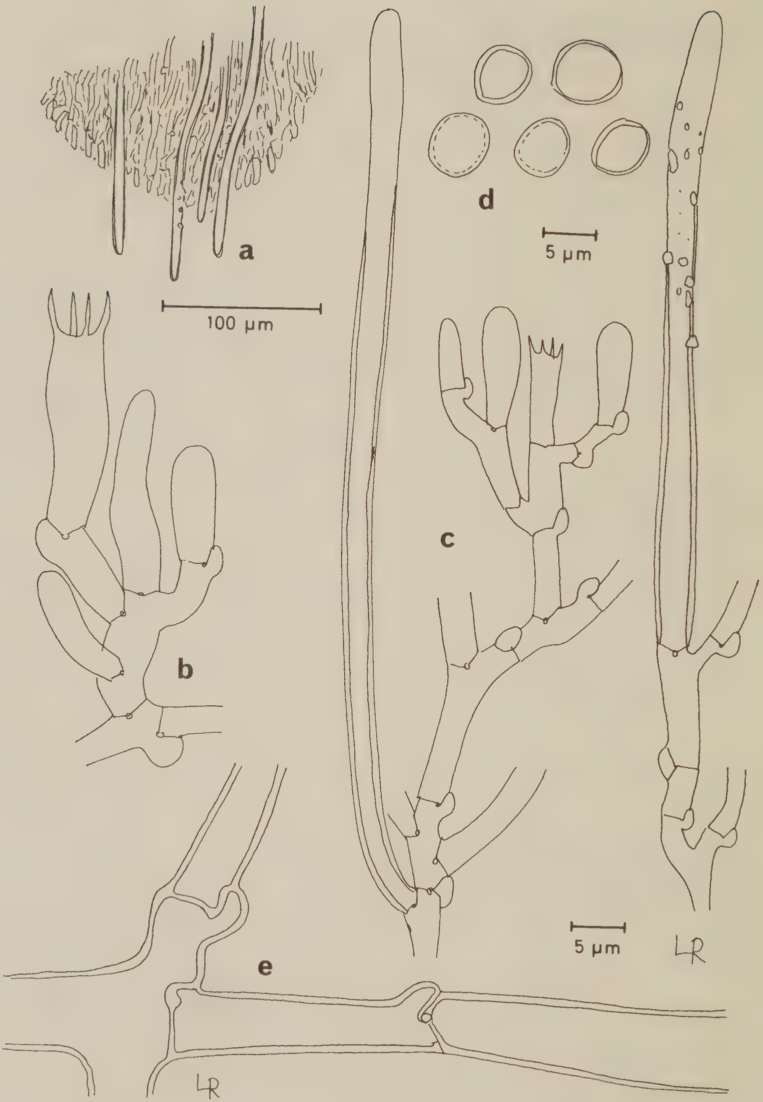
a
100 µm
b
c
d
5 µm
5 µm
LR
e
LR

Fig. 1. Hypochnicium longicystidiosum a) section through an aculeus b) basidium c) cystidia d) spores e) basal hypha. Coll. R. 18966.

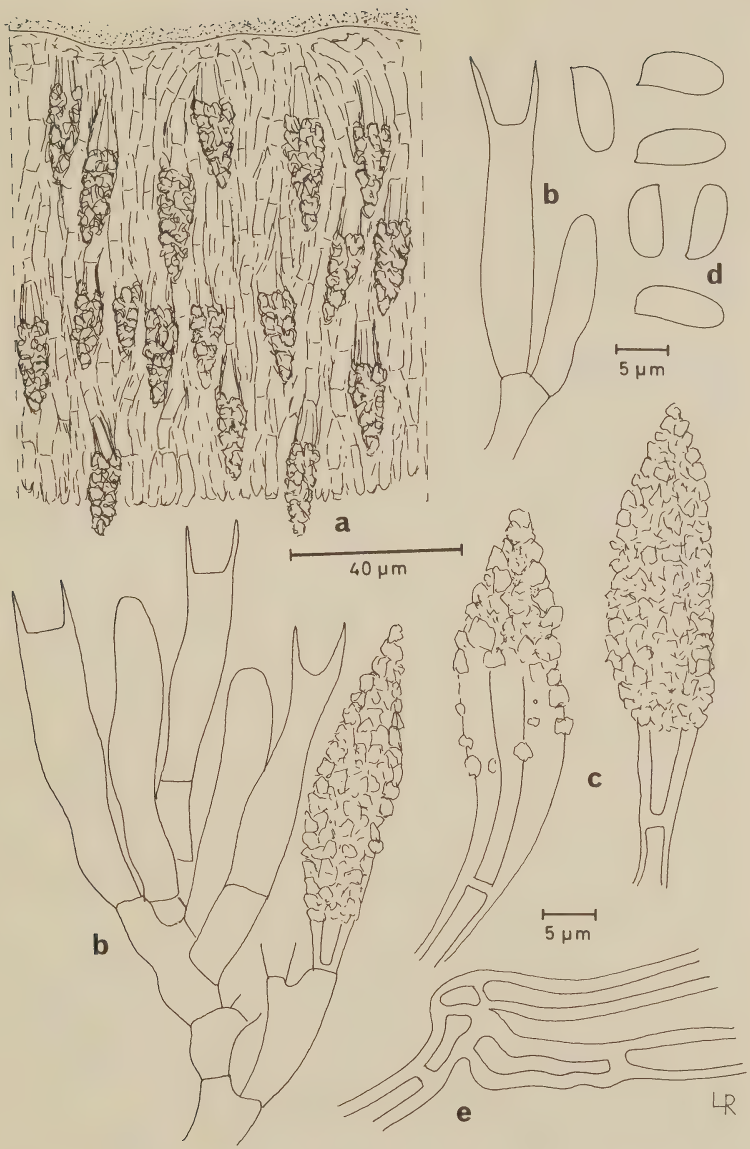
a
b
d
5 µm
40 µm
b
c
5 µm
e
LR

Fig. 2. Peniophora bicornis a) section through hymenium b) basidia c) cystidia d) spores e) basal hypha. From the holotype.

Himachal Pradesh. 1971-10-06. Rattan No. 4377 (K)! 18891, 18966, 18967.

This species clearly belongs in Hypochnicium because of the thick-walled and cyanophilous spores (described as thin-walled by Rattan). The cyanophilous reaction is also prominent in the hyphae and the thick-walled, cylindrical cystidia. In the Corticiaceae of North Europe Eriksson & Ryvarden divided Hypochnicium into six groups, and this species fits best into the H. sphaerosporum-group with H. detriticum as the closest relative.

H. polonense (Bres.) Strid. 18740.

Melzericium udicolum (Bourd.) Hauerslev. 18867.

This species is determinated following the sense of Eriksson and Ryvarden (1976), but has somewhat shorter spores (7-8 um long). Compare also Jülich (1976).

Mycoacia aurea (Fr.) Erikss. & Ryv. 18983.

Peniophora bicornis Hjortst. & Ryv. spec. nov. Fig. 2.

Differt a Peniophora cinerea basidiis 2-(vel 3) sterigmaticis et hyphis non fibulatis. Fructificatio distincte resupinata, colore argillaceo.

Holotypus: Nepal. Gandaki prov., Pokhara, 1200 m, on deciduous wood. 1979-10-27. Leif Ryvarden 18506 (O). Isotypus: in herb (GB). Paratypus: Nepal. Gandaki prov., Khare, 1500 m, on deciduous wood. 1979-10-28. Leif Ryvarden (O, GB). 18599.

Fruitbody resupinate, closely attached to the substratum, 0.1-0.3 mm thick, slightly tuberculate (lens) and moderately cracked, in dried state clay-coloured (argillaceous) with pale rosy tint, margin poorly defined. Hyphal system monomitic. Subiculum composed of densely packed, thick-walled hyphae, 2.5-3.5 um wide, pale brown pigmented. Subhymenial hyphae hyaline, thin-walled, 2-3 um wide. All hyphae without clamps. Cystidia numerous, (metuloids), as immature semihyaline, thin-walled and simulating gloeocystidia, gradually strongly encrusted and brown, normally 30-35 x 7-10 um, gloeocystidia lacking. Basidia subclavate, slightly sinuous and constricted, thin-walled or by degree with thickened walls, without basal clamp, usually with 2 (rarely 3 or 4) sterigmata, 25 x 4.5-5 um. Spores suballantoid, smooth, thin-walled, hyaline, (6-)7-8(-9) x 3-3.5 um, non amyloid.

Remarks. The species is externally somewhat similar to P. cinerea, but under a microscope immediately separated from that species by the bi-sterigmatic basidia and clampless hyphae. Another species, P. confusa, described by Gómez and Loewenbaum (1976) from Argentina is, according to the description, quite similar but has gloeocystidia and the basidia have 4 sterigmata bearing slightly narrower spores.

P. cinerea (Fr.) Cooke. 18949, 18950.

Phanerochaete filamentosa (Berk. & Curt.) Burds. 18646.

P. radulans Hallenb.

A very good collection of this species and compared with the type (in GB). It should be noted that Radulum subquercinum P. Henn. is very closely related, and on basis of collections examined from East Africa these appears to be a species-complex containing several closely related taxa. (See also Hjortst. & Ryv. 1982).

P. tuberculata (Karst.) Parm. 18780.

P. sordida (Karst.) Erikss. & Ryv. 18804, 18918, 18987.

P. viticola (Schw.) Parm. 18552.

Phlebia albo-fibrillosa Hjortst. & Ryv. spec. nov. Fig. 3. Differt a Phlebia queletii sporis subglobosis (raro distincte globosis). Fructificatione cremeo-albida. Margo fibrosus, albidus.

Holotypus: Nepal. Gandaki Prov. Kuldi, Annapurna trek, 2400 m. 1979-11-07 Leif Ryvarden 18979 (O). Isotypus: in herb (GB). Paratypi: 18613, 18710, 18737, 18905, 18932, 18934, 18986.

Fruitbody resupinate, closely adnate, effused, strongly odontioid, hymenium between the aculei whitish, fairly thin, somewhat pilose owing to the projeting cystidia (lens 50 X), aculei slightly darker than the hymenium, up to 0.5 mm long, conical and approximately 3-5 per mm, margin pubescent or fibrous, whitish. *Hyphal system* monomitic. Hyphae about 3 um wide, thin-walled or with slightly thickened walls, those of subhymenium and of the aculeal trama more or less parallel, closely packed but not agglutinated as in many species of *Phlebia*, all hyphae with clamps. *Cystidia* numerous, usually more than 100 um long, strongly encrusted, thick-walled and often with several adventitious septa and with a basal clamp. *Basidia* subclavate, about 20-25 x 5(-5.5) um, thin-walled, with 4 sterigmata and a basal clamp. *Spores* subglobose (seldom globose) 4-4.5(-5) x 3.5-4 um, thin-walled, inamyloid, acyanophilous.

Remarks. Although *Phlebia queletii* (Bourd. & Galz.) M. P. Christ. is similar it is easily separated by its ellipsoid spores 5-6 x 3-3.5 um and by a darker (yellowish-ochraceous) hymenium. The fibrous margin is more pronounced in *Ph. albo-fibrillosa* though this also occurs to a some degree in well developed *Ph. queletii*.

Hjortstam and Ryvarden (1980) referred a specimen determined by Bresadola to *Kneiffia brasiliensis* Berk. Recently the holotype of this species (Rio de Janeiro, M. Glaziou. Sept. 1876, K) was examined. This species should better be treated near such species as *Corticium archerii* Berk. and *Kneiffia wrightii* Berk. & Curt. The other specimen from Brazil (Bresadola´s determination), however, belongs near *Ph. albo-fibrillosa* and *Ph. queletii* but seems to be separated by smaller spores and shorter cystidia.

P. bresadola Parm. 18652.

This acystidiate species is fairly well known from North Europe, where it occurs on *Populus tremula*, though rare. The Nepalese collection (substratum unknown) has the subiculum, at least at the perifery, more loose with hyphal and basidial structures easily separated in a squash-preparation. In well developed parts of the fruitbody the hyphae are more densely agglutinated.

P. centrifuga Karst. 18877.

P. deflectens (Karst.) Ryv. 18747.

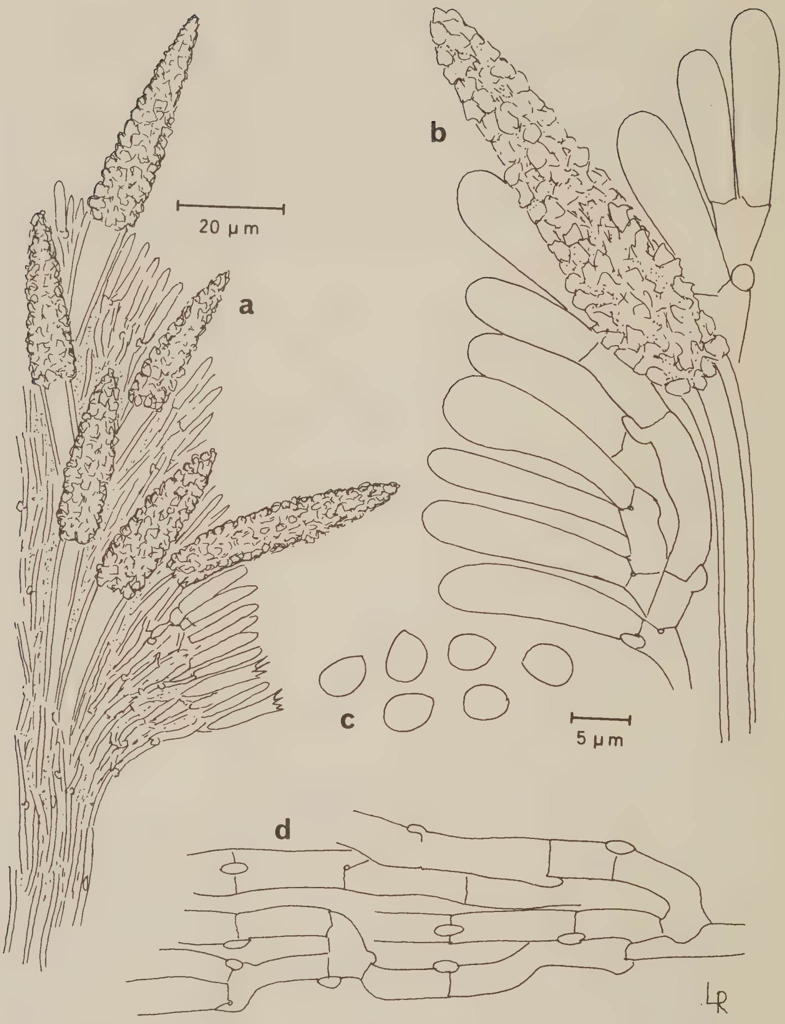
b
20 μm
a
c
5 μm
d
LR

Fig. 3. Phlebia albo-fibrillosa a) section through aculeus b) cystidium and unripe hymenium c) spores d) basal hyphae. From the holotype.

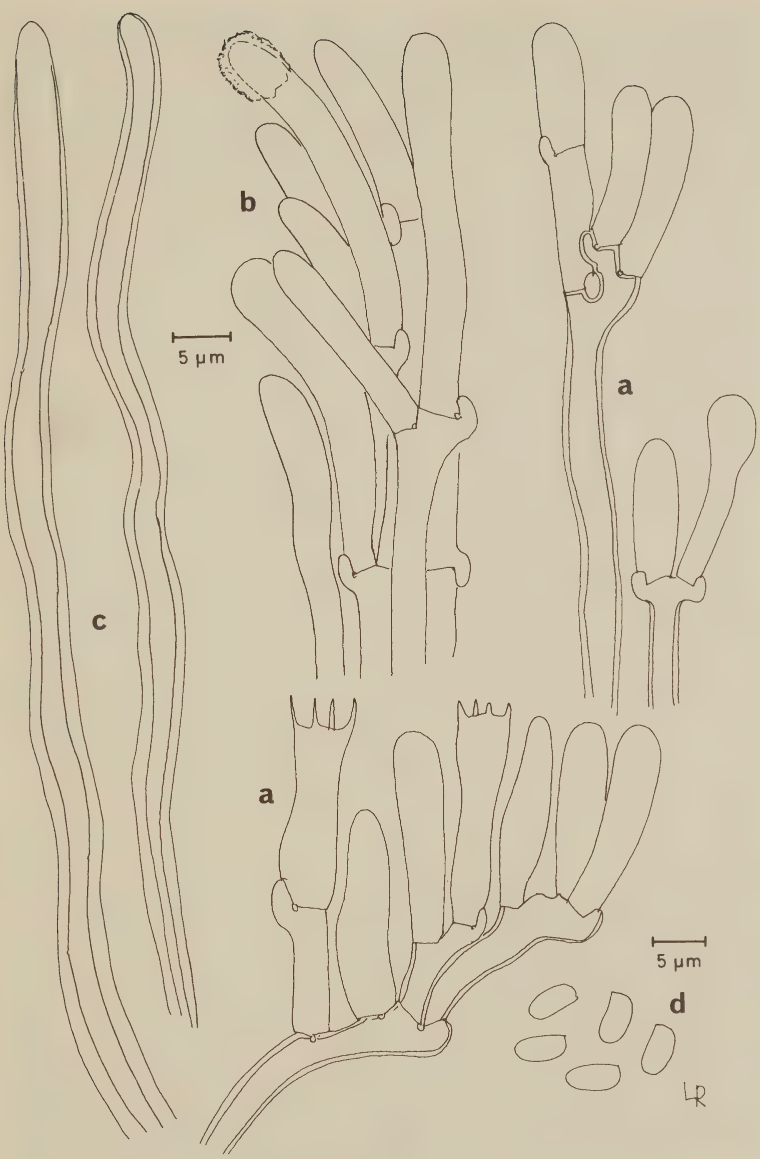
b
5 µm
a
c
a
5 µm
d
LR

Fig. 4. Schizopora roseo-tingens a) basidia b) hyphae with encrusted apex c) skeletal hyphae d) spores. From the holotype.

P. livida (Fr.) Bres. 18565, 18874, 18895.
P. martiana (Berk. & Curt.) Parm. 18953.
P. radiata Fr. 18543, 18736.
P. verruculosa Hjortst. & Ryv. 18796/E.
This is the first collection outside East Africa (type-locality: Tanzania). It should be mentioned that several additional specimens are now known from Africa, discovered since the description, (Hjortstam and Ryvarden 1980).
Phlebiopsis gigantea (Fr.) Jülich. 18525, 18752.
P. roumequerii (Bres.) Jülich & Stalpers. 18624, 18643, 18700, 18750. The syntype of this species has been studied: Florentiae 09.1890, leg. U. Martelli (portion in GB). Brief description of microscopical characteristics: Hyphae dense, 2.5-3.5 um, thin-walled, without clamps. Cystida conical, strongly encrusted (metuloids), about 50-80 um long, without basal clamp. Basidia 20-25 x 4 um, with 4 sterigmata, without basal clamp. Spores 5-5.5 x 2.8(-3) um, abaxial side concave.
Radulomyces confluens (Fr.) M. P. Christ. 18787.
Ramaricium flavomarginatum (Burt) Ginns. 18538, 18798.
Not previously reported outside North America where according to Ginns (1979) it is found on Quercus garryana in the western coastal areas. Externally it is similar to other species of the genus, but microscopically immediately separated by smooth and slightly sigmoid spores, reminiscent of those of Lepiota.
Resinicium bicolor (Fr.) Parm. 18661, 18665, 18685.
Schizopora roseo-tingens Hjortst. & Ryv. spec. nov. Fig. 4 & 5. Fructificatio resupinata, effusa, adnata, cremicolor vel dilute erubescens, hymenium distincte odontioides, inter aculeos leve, circiter 0.1-0.2 mm crassum, aculei plus minus conici, firmi, versus apicem leviter fimbriati, raro complanati, plerumque 0.5-1 mm longi, subiculum dilute erubescens, aliquantum densum et tenax, margo plus minus reflexus; systema hyphale dimiticum, hyphis generatoris tenuitunicatis, abundanter ramosis, fibulatis, 3.5-4 um latis, hyphis skeleticis crassitunicatis, incoloratis, rectis, raro ramosis, fibulis nullis, 2.5-3(-4) um latis, neque dextrinoidibus neque cyanophilis; cystidia desunt, in aculeis hyphoideis incrustatis disposita; basidia subclavatis, suburniformibus, 20-25 x 4.5-5 um, 4 sterigmatibus; sporis ellipsoidibus, tenuitunicatis, 4-4.5 x 2-2.2 um, neque amyloidibus et cyanophilis neque dextrinoidibus.
Holotypus: Nepal, Gandaki Prov. Kuldi, Annapurna trek. 2400 m. on deciduous wood, 1979-11-07. L. Ryvarden 18989 B (O).

Fruitbody resupinate, adnate, creamish to light brown or with rosy tint, distinctly odontioid to hydnoid with smooth and firm, about 0.1-0.2 mm thick, hymenium between the aculei, individual aculei more or less conical or subcylindrical, rarely flattened, smooth or with a slightly fimbriate apex, mostly 0.5-1 mm long. Subiculum 0.3-0.5 mm thick,

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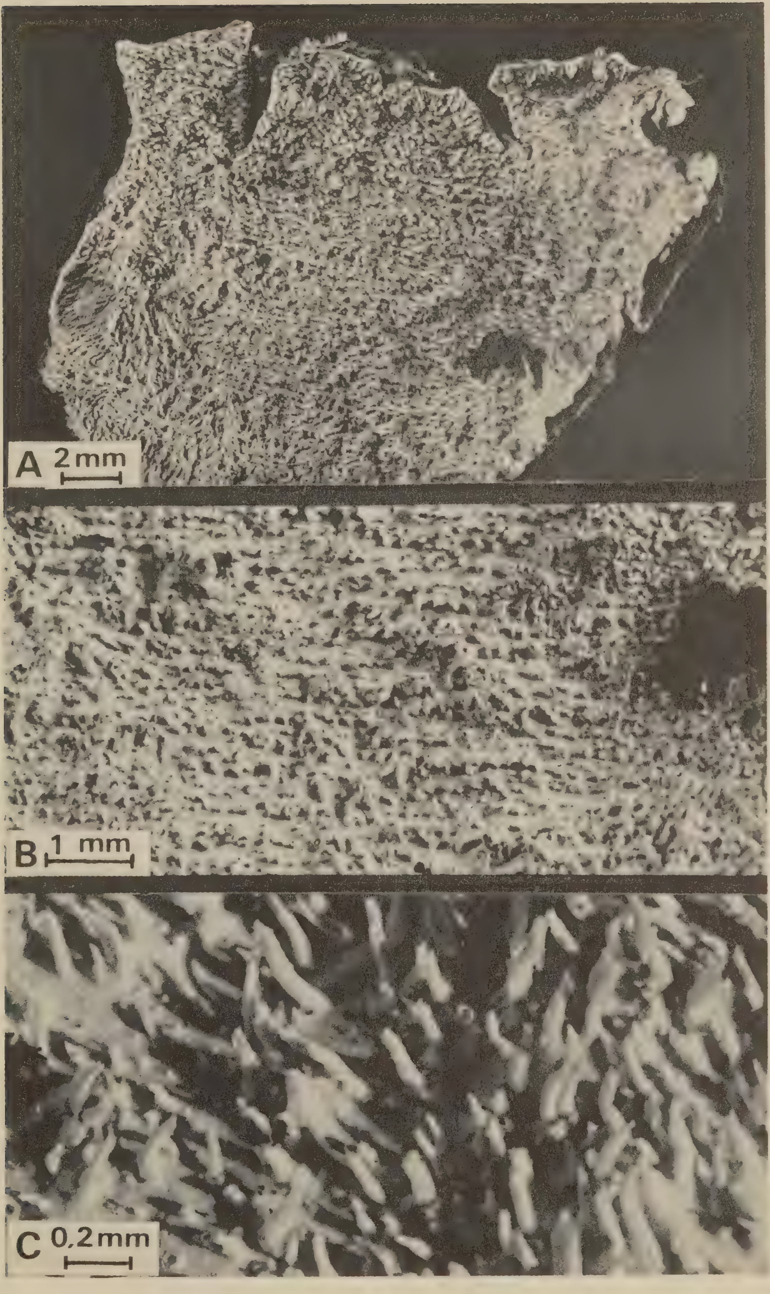
Fig. 5. Schizopora roseo-tingens, different views of the fruitbody. From the holotype. Photo T. Hallingbäck.


A 2mm
B 1 mm
C 0,2mm

light rosy brown, fairly dense and tough. Margin not especially differentiated but loosening and tend to be more or less reflexed. Hyphal system dimitic. Generative hyphae strongly branched, 3.5-4 um wide, thin-walled, with clamps. Skeletal hyphae straight and rarely branched, thick-walled with fairly narrow, 1-1.5 um wide lumen, without clamps or such seen only in transition stage between generative and skeletal hyphae. The skeletals in the central part of the aculei intertwined, rarely parallel, indextrinoid, inamyloid or acyanophilous. Cystidia lacking but in the aculei with scattered capitate hyphal ends, seemingly originating from tramal hyphae, often encrusted apically with resinous substance. Basidia subclavate, more or less suburniform, 20-25 x 4.5-5 um, with 4 sterigmata and basal clamp. Spores ellipsoid, thin-walled, 4-4.5 x 2-2.2 um, inamyloid, acyanophilous, indextrinoid.

Remarks. The new species is placed in Schizopora on the basis of the conspicuous skeletal hyphae and similar basidia and spores. On the other hand, the thin-walled hyphae differ in the shape of the clamps and the irregularity of the walls. An alternative to Schizopora could be Fibrodontia but the hymenial structure deviates from that genus in its narrow sense (see below). Schizopora roseo-tingens is well separated from other species by a strictly odontioid hymenium and pale rosy colour. Nevertheless, in both macro- and microscopic features the species is intermediate between species of Hyphodontia, Fibrodontia and Schizopora. The latter genus comprises species with an obviously tough consistency, both porioid and such with a more irpicoid or labyrinthine hymenium, whereas Fibrodontia sens. str. (limited to the type species) is fairly soft, somewhat fibrous and typically odontioid. Both genera are generally accepted and described as dimitic. Species of Hyphodontia are monomitic, even if some species have large cystidia of subicular origin (pseudocystidia) seemingly like those of Fibrodontia but with fairly wide lumen. At present we prefer to include the new species within Schizopora rather than to extend Fibrodontia until a better knowledge of both the morphology and cultural tests can be acertained for these genera.

Scopuloides hydnoides (Cooke & Massee) Hjortst. & Ryv. 18936, 18941. Jülich (1982) placed this species in synonymy with Peniophora rimosa Cooke. On account of the variability of this taxon and that the type material of P. rimosa was temporarily unavailable at Kew we prefer to use this well known name. Specimens seen from Central Europe, East Africa, and also from Nepal show that several more or less closely related taxa occur.

Scopuloides sp. Ryv. 18981.

In essential characteristics, the nature of cystidia, basidia, and hyphal structure, this specimen agrees with S. hydnoides but differing in the suballantoid spores, 4.5(-5) x 1.2(-1.5) um. Externally the small cylindrical aculei are also of importance to separate this fungus from S. hydnoides. It should be noted that the type of P. hydnoides was not studied on this occasion.

Scytinostroma ochrolecuum (Bres.) Donk. 18613/B.

The material is fairly small, but easily recognized by the following characteristics: dextrinoid skeletal hyphae, stout basidia, and smooth, large inamyloid spores. For its general distribution, see Parmasto (1970).

S. portentosum (Berk. & Curt.) Donk. 18745.

The species is treated here in its wide sense, to include S. hemidichophyticum. Pouz.

Sistotrema brinkmannii (Bres.) John Erikss. 18873, 18933.

S. oblongisporum M. P. Christ. 18971.

A variable species in spore morphology which needs further studies on cultural level. The Nepal specimen consist of a small fragment but microscopically well developed. The smooth adnate fruitbody, slightly curved spores 4 x 1.8(-2) um together with small and urniform basidia characterize this species.

Stereum sanguinolentum (Fr.) Fr. 18904, 18913.

Trechispora aff. **farinacea** (Fr.) Liberta. 18626.

Xenasma praeteritum (Jacks.) Donk. 18539, 18777.

In its general features e.g. spores, basidia, and hyphal structure similar to the concept of the species but differs from other specimens seen by having an odontioid appearance. The small and scattered aculei are spread over the hymenium and make the specimen quite characteristic.

Xenasmatella tulasnelloidea (Höhn. & Litsch.) Oberw. 18817, 18907, 18988.

HYMENOCHAETACEAE

Hymenochaete cruenta (Pers.:Fr.) Donk 18912, on Rhododendron.

Inonotus flavidus (Berk.) Ryv. comb. nov. Basionym: Polyporus flavidus Berk. Hook. J. Bot. 6:161, 1854. Syn. Inonotus sciurinus Imaz. 18636, 18709, 18733, 18954.

Inonotus hamusetulus Ryv. nov. sp. Fig. 6.

Fructificatio sessilis, pileus ferreus vel brunneus, zonatus, velutinus, pori facies ferra, pori 5-7 per mm, contextus ferreus, duplex cum zona nigra sub tomentum in pileo. Systema hypharum monomiticum, hyphae generatoriae afibulatae, ferreae, crassae vel tenuitunicatae, setulae hamatae, sporae subglobosae, 3-5 x 3-3,5 um, hyaline vel pallide flavus.

Typi: Nepal, Gandaki prov. Khare 1500 m, 28 Oct. 1979, on deciduous tree. L. Ryvarden 18591 (O, holotype, K, isotype).

Fruitbody annual, sessile and flabellate up to 8 cm wide and 12 cm long, and 10 mm thick at the base, margin thin and sharp bent down in dry condition, pileal surface dark rusty brown to dark brown at the base, first coverd with a fine adpressed tomentum under which there is a thin black zone with age becoming exposed from the base, faintly zonate in sulcate zones and slightly wrinkled radially when dry, pore surface dark rusty brown, pores round to angular 5-7 per mm, tubes concolorous, up to 6 mm deep, context rusty brown, dense and duplex with a black zone above.

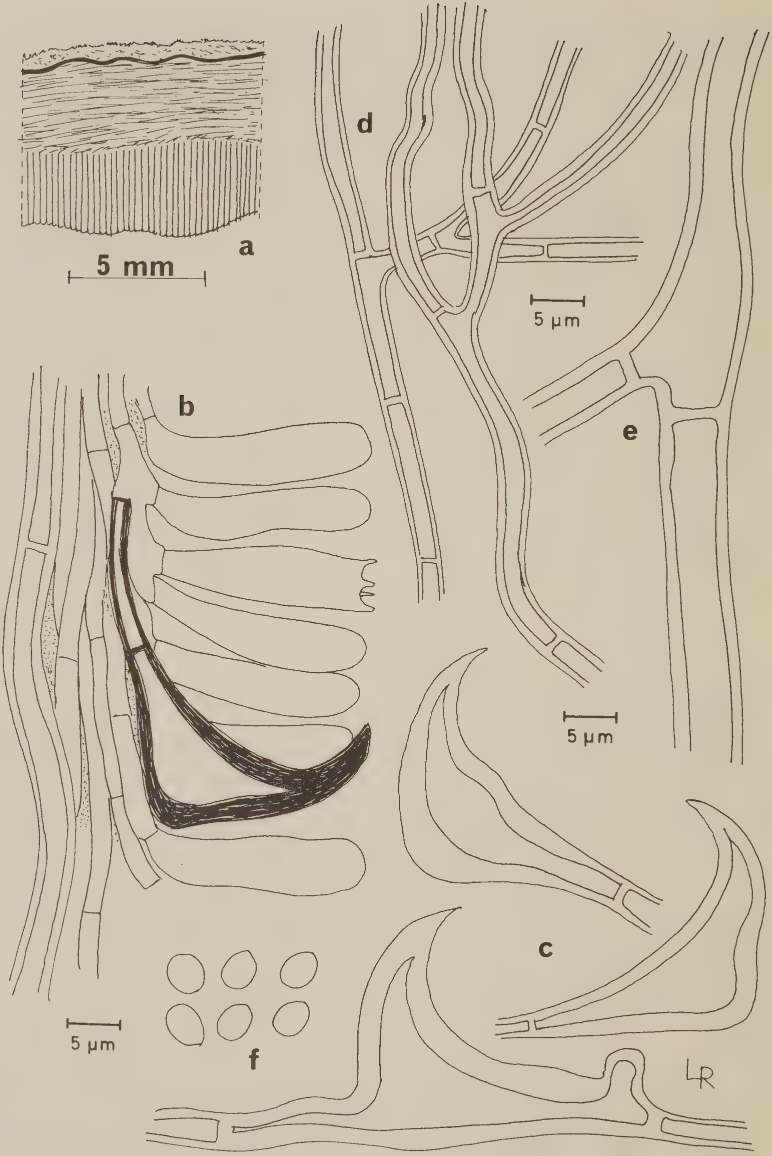

a
5 mm
b
5 µm
c
d
5 µm
e
5 µm
f
LR

Fig. 6. Inonotus hamusetulus a) section through fruitbody b) from the hymenium c) setae d) hyphae from the trama e) hyphae from the context f) spores. From the holotype.

Hyphal system monomitic, and generative hyphae with simple septae, in the subhymenium thin to slightly thick-walled and abundatnly septate, 2-3 um wide, in the trama and context with a wider lumen, sparsely branched and with scattered to rare septa, 3-8 um wide, setae numerous, hooked, 20-30 um from base to top, often elongated in a long rooflike base, a few also birooted and up to 40 um long at the base, thick-walled and dark brown, spores hyaline to pale yellowish, subglobose 3-4 x 3-3,5 um, acyanophilous and non-amyloid.

I. hamusetulus is related to I. radiatus (Fr.) Karst. and I. crocitinctus (Berk. & Curt.) Ryv. All three species are characterized by hooked setae and small, hyaline to pale yellowish subglobose spores. The spore-range decreases from I. radiatus to I. hamusetulus. The closest relative to I. hamusetulus is the North American I. crocitinctus which has slightly larger spores (4-4,5 x 3-3,5 um), distinctly more ventricose setae and minute pores (7-8 per mm).

Phellinus acontextus Ryv. nova. sp. Fig. 7.
Fructificatio pendens, pileus glaber, brunneus, densus zonatus, pori facies brunneus, pori minuti 6-8 per mm, tubi brunnei, contextus destitutus vel tenuissimus, cinnamomeus, systema hypharum dimiticum, hyphae generatoriae afibulatae, hyphae skeletales ferrugineae, setae destitutae, sporae ellipsoideae, ferrugineae, 5,5-6,5 x 3,5-4 um.

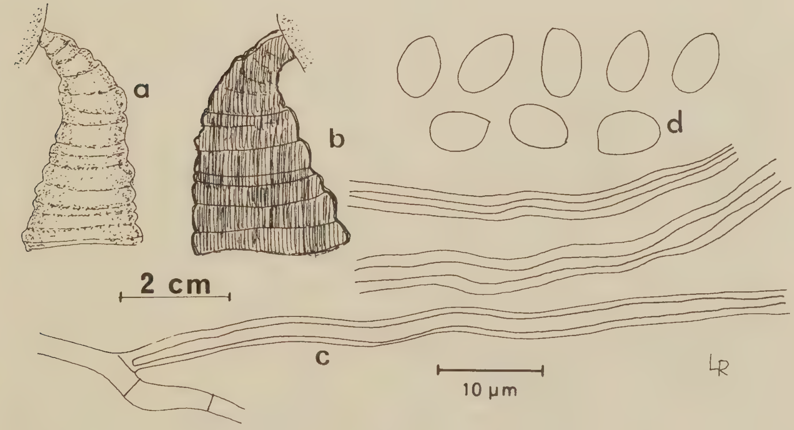


Fig. 7. Phellinus acontextus a) fruitbody b) section through a fruitbody c) skeletal hyphae d) spores. From the holotype.

Typi: Nepal, Gandaki prov. Ghorapani 2800 m, 30. Oct. 1979, on Abies sp. L. Ryvarden 18742. (O, holotype, K isotype). Fruitbody pendant and small, ungulate, 2,5-3 um high and 1,5-2 cm diam, circular to irregular in section, brittle and light of consistency when dry. Pileus dark brown to almost black, glabrous, densely zonate with narrow and in part sharp ridges, covered with a thin black cuticle, 100-250 um thick, margin sharp, pore surface dark rusty to umber brown, pores minute, almost invisible to the naked eye, 6-8 per mm, tubes dark rusty brown, slightly zonate up to 3 cm deep, context lacking or extremely thin (lens!) close to the base, cinnamon.

Hyphal system dimitic, generative hyphae with simple septae, hyaline 2-3 um wide, skeletal hyphae narrow and thick-walled, golden to pale rusty brown, 2-4 um wide, setae none, spores rusty brown, ellipsoid, 5,5-6,5 x 3,5-4 um non-amyloid.

This is a striking species with small and distinctly pendant fruitbodies and either lacking a context or present only as an extremely thin cinnamon layer next to the black cuticle close to the base of the fruitbody. The spores are more strongly coloured than is usual in the genus. The species seems to take up a rather isolated position in the genus.

Phellinus allardii (Bres.) Ryv. 18619, 18963.
P. gilvus (Schw.) Pat. 18554, 18758.
P. punctatus (Fr.) Pil. 18596.
P. wahlbergii (Fr.) Reid. 18555.

POLYPORACEAE

Antrodia malicola (Berk.) Donk. 18587, 18977.
A. sinuosa 18711.
Antrodiella semisupina (Berk. & Curt.) Ryv. 18607, 18818.
Ceriporia excelsa (Rom.) Parm. 18890.
C. subreticulata Ryv. 18711.
C. xylostromatioides (Berk.) Ryv. 18633.
Daedalea incana (Lév.) Ryv. comb. nov. Basionym Trametes incana Lév. Ann. Sci. Nat. Ser. 3, vol. 2:196, 1844. The species is related to Daedalea quercina, separated by smaller and more regular pores. Both species exhibit a brown rot in the attacked wood. D. incana is widespread in Asia and is often named D. dickensii Berk. in Japanese and Chinese herbaria and papers.
Datronia mollis (Somf.:Fr.) Donk 18899.
Fomes fomentarius (Fr.) Kickx. 18590, 18947.
Grammothele bambusicola Ryv. nov. sp. Fig.8 .
Fructificatio resupinata, pori facies ochracea, pori 2-3 per mm. System hypharum dimiticum, hyphae generatoriae hyalinae, tenuitunicatae et fibulatae, hyphae skeletales crassitunicatae, hyalinae, non dextrinoideae, dendrohyphidia sparse ramosa praesentia in pori margine et hymenio, sporae ellipsoideae, 7-8,5 x 4-5 um, non-amyloideae.

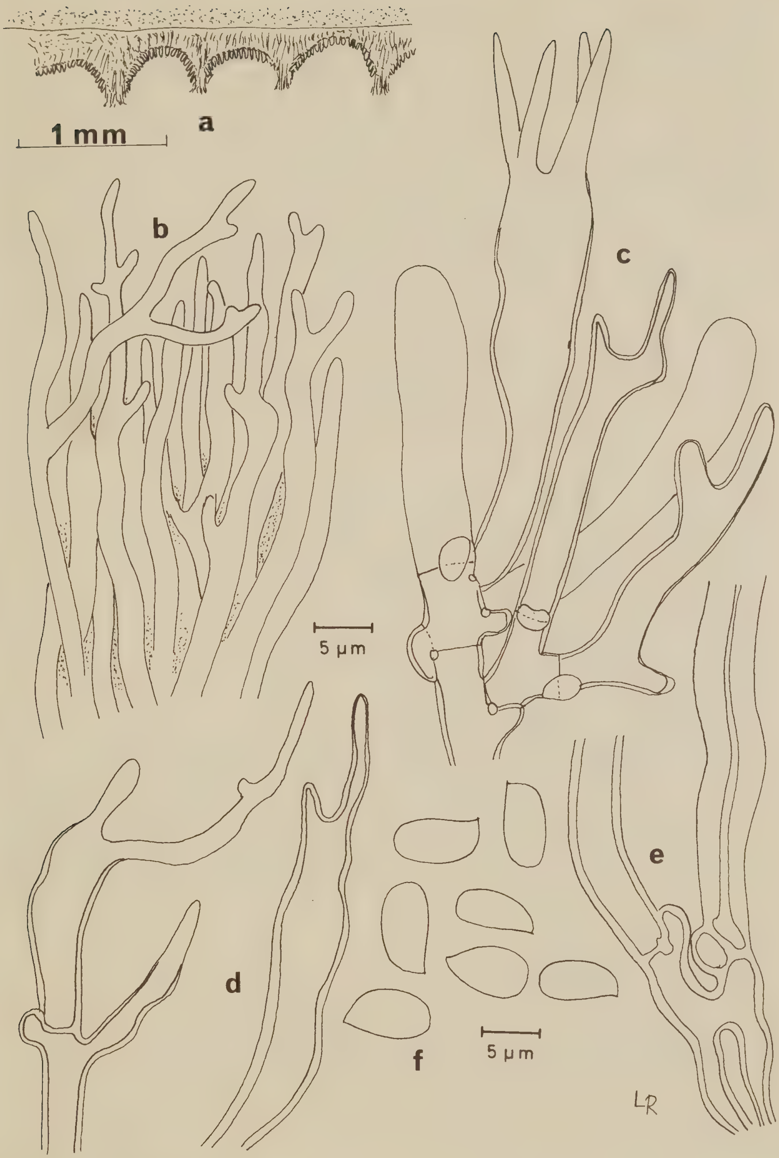


Fig. 8. Grammothele bambusicola a) section through fruit-body b) hyphae from the pore-edges c) basidium and dendroid hyphae e) branched organs from the hymenium e) basal hyphae f) spores. From the holotype.

Typi: Nepal, Gandaki prov. Ghorapani, 2800 m, 30 Oct. 1979. On Bambusa sp. L. Ryvarden 18718 (O, holotypus, K, isotypus).

Fruitbody resupinate, effused, adnate, up to 1 mm thick, pore surface cream to strawcoloured or pale yellowish brown when old, pores round to sinuous on sloping substrata, 2-3 per mm and shallow, context white and very thin.

Hyphal system dimitic, generative hyphae with clamps, thin- to thick-walled, hyaline to pale yellow, 3-8 um wide, skeletal hyphae thick-walled and pale yellowish, without dextrinoid reaction, 3-5 um, sparsely branched dendrohyphidia in the hymenium with 2-3 apical branches, slightly thick-walled in the basal part, up to 35 um long, in the poremouths more narrow and branched, basidia clavate with 4 large sterigmata, 30-40 x 5-8 um, spores oblong ellipsoid, thinwalled and non-amyloid, 7-8,5 x 4-5 um. On Bambusa sp.

This species comes close to G. ochraceus Ryv. from Thailand, but is separated by larger pores, a more yellowish colour, sparsely branched dendrohyphidia and longer and more ellipsoid spores.

Irpex lacteus Fr. 18597.

Ischnoderma resinosum (Fr.) Karst. 18641.

Junghuhnia nitida (Fr.) Ryv. 18630.

Microporus vernicipes (Berk.) Kunt. 18992.

Oxyporus cervino-gilvus (Jungh.) Ryv. 18592.

Perenniporia inflexibilis (Berk.) Ryv. 18601.

P. tenuis (Schw.) Ryv. 18639.

Pachykytospora papyracea (Schw.) Ryv. 18532.

Polyporus ciliatus Fr. 18588, 18880.

Rigidoporus ulmarius (Fr.) Imaz. 18955.

Sceletocutis alutacea (Lowe) Kell. 18514, 18797, 18901.

S. nivea (Jungh.) Kell. 18659.

Spongiporus cerifluus (Berk. & Curt.) David. 18803.

S. luteocaesius David. 18753. on Abies sp. This is the second collection of this species recently described by David (1980:29). The Nepalese collection matches the description very well. Briefly, the species can be described as a T. caesius with brown pileus. The specific epithet is misleading as the yellow colour disapears in dry condition and the pore surface attains the pale mouse-grey colour as in a typical S. caesius.

S. cerifluus (Berk. & Curt.) David. 18803.

Trametes cingulata Berk. 18504.

Tyromyces. dissectus (Lév.) Ryv. 18698.

T. gilvescens (Bres.) Ryv. 18649, 18696, 18756, 18872.

T. gratus (Berk.) Ryv. 18698.

T. leucomallus (Berk. & Curt.) Murr. 18663, 18762, 18989.

Wrightoporia lenta (Overh. & Lowe) Pouz. 18699.

TREMELLACEAE

Aporpium caryae (Schw.) Teix. & Rog. 18947.

Acknowledgements.

Dr. D. Pegler, Kew, has suggested linguistic improvements and otherwise given valuable help, for which we are very grateful.

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MYCOTAXON

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NOTICE

INTERNATIONAL MYCOLOGICAL ASSOCIATION

RECORD OF BUSINESS MEETINGS AND GENERAL ASSEMBLY
CONVENED DURING THE THIRD INTERNATIONAL MYCOLOGICAL
CONGRESS, TOKYO, 28 AUGUST-3 SEPTEMBER 1983

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A. Preamble

1. This Notice provides a record of the Business Meetings and General Assembly of the International Mycological Association (IMA), and also of its Committees, convened during the Third International Mycological Congress (IMC3), Tokyo, 28 August-3 September 1983.

2. A record of the previous Business Meeting, held on 26 August 1981 during the XIII International Botanical Congress in Sydney was published in Mycotaxon **16** (1): 335-339 (1982). Reports of Committees and officers included in the present Notice relate to the period since the Sydney Business Meeting.

B. Honorary Presidents

3. At the Opening Ceremony of the Congress, Professor C.V. Subramanian (President, IMA) paid tribute to the foresight of Dr Geoffrey C. Ainsworth (formerly Director, Commonwealth Mycological Institute) which led to the establishment of International Mycological Congresses and of the IMA itself in 1971. Further, tribute was also paid to Professor Costantin J. Alexopoulos, who presided over IMC2, and the work he has undertaken for international mycology. These two exceptional individuals have devoted so much of their lives to the service of mycology and were accepted with acclamation as the first Honorary Presidents of the IMA.

C. Apologies for absence

4. Apologies for absence were received from the following members of the IMA Executive Committee who were unable to attend IMC3: Dr J.A. von Arx (Treasurer), Dr C. Booth, Dr E. Parmasto, Dr M.A. Peerally, Professor K.S. Thind, Dr J. Walker and Dr G.C.A. van der Westhuizen.

D. Secretary's Report

5. Reports of action taken since 1981 are noted under the appropriate heads below.

E. Treasurer's Report

6. Dr von Arx submitted a statement of the financial situation of the IMA, which showed a balance of Hfl 29,582.90 as at 1 July 1983.

F. Nomenclature Secretariat

7. The IMA Nomenclature Secretariat convened its meeting on 1 September 1983. In the absence of its Chairman, Dr K.T. van Warmelo, the meeting was chaired by Dr R.H. Petersen. Also in attendance were Drs Otani (Japan), Hawksworth (UK) and Gams (The Netherlands) of the Secretariat, and Drs Wang (People's Republic of China) and Demoulin (Belgium) as invited guests.

8. A report from Dr van Warmelo was read and accepted. All proposals on which action was taken at IMC2 were summarized and published in Taxon (**28**: 424-431, 1979), effectively fulfilling the mandate to the Secretariat. Many of the proposals made were adopted by the XIII International Botanical Congress and incorporated into the Code. The subcommittees which had produced the proposals were then informally disbanded.

9. On behalf of the IAPT Special Committee for Fungi, Dr Petersen informed the Secretariat that the Special Committee is prepared to take responsibility for remaining IMA Secretariat duties, including authority for one remaining subcommittee on the nomenclature of fossil fungi (Secretary Dr Reynolds).

10. Accordingly, the Secretariat requested that it be disbanded, with its role to pass to the IAPT Special Committee, and this was agreed. Concommitantly, it urged the IMA Executive Committee to reappoint the Secretariat at any appropriate future time, and recorded its thanks to Dr van Warmelo for his service to the Secretariat.

G. Regional Committees

11. During the Congress, the Committee for the Development of Mycology in Asian countries was firmly established under the Chairmanship of Dr K. Tubaki. It drew up and adopted the following Statutes.

12. Article 1. The name of the Committee shall be "Committee for the development of mycology in Asian countries".

13. Article 2. The general objective of the Committee shall be to promote the development of mycology, with activities for mycological education, training, research, and service in countries and regions in Asia.

14. Article 3. The membership of the Committee shall be composed of representatives of the Mycological Society or related Societies in each country and regions, or individual persons who are willing to contribute for the development of mycology in the regions concerned.

15. Article 4. The Committee shall be composed of: (a) Chairman, Dr K. Tubaki; (b) Vice-Chairman or Vice-Chairmen, Dr F.R. Uyenco; and (c) Secretary or Secretariat, Dr M.A. Rifai and Dr T. Yokoyama.

16. Article 5. The term of the members shall be within the years between one and the next Congress.

17. Preliminary discussions with UNESCO in 1982 suggest they would contribute to the cost of the IMA running a workshop on the problems confronting mycology in Asia, but that the IMA would have to provide a significant part of the cost.

18. The Committee for the Development of Mycology in Latin-American countries reported that little progress had been made owing to the numerous problems in the region at the present time.

H. **Statutes**

19. As instructed at the Sydney meeting, a revised draft of the IMA Statutes had been prepared and circulated to the Executive Committee. A further revision taking account of the Executive's comments was then circulated to all Affiliated Associations for their views. The draft tabled for approved at IMC3 which was circulated to all Affiliated Organizations on 3 June 1983, incorporated amendments proposed by some of them.

20. The revised Statutes, providing for a greater involvement of individual mycologists, and also designed to place the organization on a firmer financial base were debated by the IMA Business Meeting and, with minor amendments, were then adopted unanimously by the General Assembly. The Statutes are given in full at Appendix I.

I. **Fourth International Mycological Congress**

21. All Affiliated Organizations were invited to submit offers to host IMC4 by 30 June 1983. Three well-documented proposals were received by the due date, circulated to the IMA Executive, and voted on. The first choice subsequently decided to modify its proposal and the Executive therefore had to re-consider the position.

22. It was agreed to keep IMC's distinct from International Botanical Congresses and that it was desirable to establish a regular cycle with them. The year 1990 was therefore decided for IMC4 with a view to a six-year interval being established thereafter. Shorter intervals were

not favoured as such a gap meant that there was a greater amount of new data to present.

23. The Executive Committee was pleased to annouce the acceptance of the proposal on behalf of the German mycological and botanical societies to host IMC4 in August 1990 in Regensburg, Germany. Professor Dr A. Bresinky, on behalf of the German proposers, invited mycologists throughout the world to attend IMC4.

J. **Subscriptions**

24. The subscription unit for the purpose of calculating dues of Individual Members and Affiliated Associations was fixed by the General Assembly at US $ 20. This value of the unit is intended to stay in force until IMC4, but remaining subject to revision by the Executive Committee in the interim should that prove unavoidable.

25. The Secretary-General thanked all those who had joined the IMA as Individual Members for the first time at IMC3 on behalf of the Executive Committee.

26. The Executive Committee confirmed that Individual Membership fees should be included in the Registration Fee for all participants in future IMC's and regretted that the Committee's decision to do this had not been adequately implemented at IMC3.

K. **Relationships with IUBS and IUMS**

27. The IMA constituted the Section of General Mycology within the Division of Botany and Mycology of the International Union of Biological Sciences (IUBS). At the IUBS General Assembly in Ottawa in September 1982, IUBS dissolved its divisional structure, despite strong representations from the Division of Botany and Mycology. Sections and Commissions within IUBS were allowed to group freely. Most organizations formerly within the Division of Botany and Mycology subsequently agreed to the establishment of an International Association of Botanical and Mycological Societies (IABMS) with the same officers and role of the former Division.

28. The IUBS Executive have confirmed that they would have no objection to the IMA being involved in both IUBS and IUMS.

29. The IMA was invited to attend meetings of the Division of Mycology of the International Union of Microbiological Sciences (IUMS) in Boston in August 1982. Following preliminary discussions in Boston, an IUMS/IMA *ad hoc* group to discuss the representation of mycology in international biology was established. This group worked by correspondence and held its first meeting during IMC3. The IMA was very pleased that Professor K. Arima (IUMS Executive Board), Professor N. Goodman (Chairman, IUMS Division of Mycology) and Dr K. Iwata (past-Chairman, IUMS Division of Mycology) were able to participate in the Tokyo discussions along with representatives of other interested societies.

30. The discussions of the ad hoc group were wide-ranging but a strong desire to work more closely together in the future emerged, and Resolution 3 adopted by the General Assembly (see below) was unanimously agreed by both IMA and IUMS representatives on the group.

L. **Affiliated Associations**

31. The Mycological Society of the Republic of China (Taipei) applied to join the IMA at IMC3. This was accepted by the Executive Committee and endorsed by the General Assembly. Professor Subramanian welcomed the Society, through its President Professor Zuei-ching Chen, to the IMA. The Society has about 250 members.

32. This brings the number of international and national organizations affiliated to the IMA to 26.

33. Following a proposal from Professor G. Pegg, on behalf of the British Mycological Society, it was agreed by the Executive Committee that at future IMCs special meetings of Affiliated Association representatives should be convened.

34. The Secretary-General agreed to invite all Affiliated Societies to send comments on IMC3 so that they could be passed to the Organizing Committee for IMC4. The same procedure had been adopted after IMC2 and led to some proposals adopted at IMC3.

M. **Executive Committee Membership**

35. Nominations for Executive Committee members and officers of the IMA were invited from Affiliated Associations and Individual Members on 7 June 1983. Nominations received by 1 September were considered by a Nominations Committee under the retiring President. Their recommendations (Appendix II) were unanimously accepted by the Executive Committee and endorsed by the General Assembly.

36. At the Closing Ceremony of the Congress, Professor Subramanian paid particular tribute to the work Dr J.A. von Arx had undertaken for the Association, having served as Treasurer from its inception in 1971 to IMC3. He regretted that Dr von Arx's health led to his not feeling able to continue for a further term. The incoming President of the IMA, Professor J. Webster, thanked Professor Subramanian and retiring members of the Executive Committee for their service to the Association since IMC2.

N. **Resolutions**

37. All participants in IMC3 were invited to submit Resolutions to a Resolutions Committee convened under the Chairmanship of Professor E.G. Simmons.

38. Most proposals submitted informally or formally to the Committee reflected concern for strengthening the discipline throughout the world, particularly in those geographical regions where communication, training, and facilities currently are inadequate for sustained

mycological work and service. In general, these proposals re-emphasized concerns reflected in Resolutions adopted at the Second International Mycological Congress, Tampa, 1977. Those resolutions focussed (1) on financial and operational support by international scientific organizations, (2) on a system of workshops and seminars addressed to regional needs, (3) on improved facilities for exchange of scientific materials (e.g. cultures, exsiccatae, and publications), (4) on support of international centres of excellance in fungus identification, and (5) on input and involvement of the mycological community in the UNEP/UNESCO Microbiological Resource Centre Program (MIRCEN), with upgrading of professional mycological expertise to high levels in these facilities.

39. The Committee proposed, **RESOLUTION 1**, that these continuing concerns form the basis of renewed approaches for programmatic and financial support by the International Mycological Association, the International Association for Lichenology and other Affiliated Organizations of the IMA, and further as appropriate by organizations such as the International Union of Biological Sciences, the International Union of Microbiological Societies, the United Nations Educational, Scientific and Cultural Organization, the United Nations Food and Agriculture Organization, the United Nations Environmental Program, and the World Health Organization.

40. The Committee for the Development of Mycology in Asiatic Countries, at its meeting during this Congress (paras 11-17), organized itself formally and determined to initiate activities of regional relevance, including establishment of directories of institutions, herbaria, living collection and research mycologists for all countries of the region, as well as compilation of informational materials on national regulations governing the collection and transport of fungus materials across international boundaries.

41. The activation of this Committee representing countries of Asia draws attention to the existence of other regional committees established at IMC2 and brings us to **RESOLUTION 2**, that the IMA continue its responsibility (1) to foster action by the regional mycological groups of Latin America, Tropical Africa, the Middle East and Asia; (2) that it activate the proposed IMA Liaison Office to improve co-operation and co-ordination in the work of regional committees; and (3) that it establish a mechanism to explore the possibility of transfer of funds between countries to support identification services and other international activities.

42. As **RESOLUTION 3**, recognizing the advantages of closer liaison between the International Mycological Association (IMA) and the International Union of Microbiological Societies Division of Mycology, this Congress agrees to an exchange of observers at Executive Meetings, to their working together whenever appropriate, and in particular invites the IUMS Division of Mycology to participate in the Fourth International Mycological Congress.

43. All three Resolutions were adopted unanimously at the Closing Plenary Session of the Congress.

O. Third International Mycological Congress

44. Professor Subramanian paid tribute to Professor N. Hiratsuka (President, IMC3), Dr K. Tubaki (Secretary-General, IMC3) and other members of the IMC3 Organizing Committee for making the Congress such a success.

45. The Congress was attended by about 900 registered delegates of which 400 were from outside Japan.

P. Future Plans

46. The Executive Committee also considered in outline plans for the IMA for the period to IMC4. Subject to the availability of resources, it was agreed that the IMA should endeavour to (a) establish a Newsletter, (b) draw up directories of mycologists and mycological resources (perhaps on a regional basis), (c) maintain its involvement with appropriate international organizations, (d) assist in the costs of workshops or attendance of IMA representatives at appropriate meetings, and (e) the establishment of an IMA Liaison Office.

47. The Secretary-General reported that the Executive Director of the Commonwealth Agricultural Bureaux (CAB) had approved the concept of the establishment of an IMA Liaison Office at the Commonwealth Mycological Institute, Kew (CMI) provided that appropriate financial arrangements can be made. The IMA Executive Committee agreed that some funds could be made available for this proposal.

D.L. Hawksworth
Secretary-General, IMA
Commonwealth Mycological Institute
Ferry Lane, Kew,
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17 December 1983

APPENDIX I

Statutes

Preamble

1. The Association shall be called the International Mycological Association (IMA).

2. The object of the IMA, a non-profit making organisation, is the encouragement of mycology in all its branches, particularly international aspects such as the promoting of International Mycological Congresses, representing mycological interests at an international level, and encouraging liaison with all national and international bodies which have mycological interests.

Management

3. The affairs of the IMA are managed by:

   3.1 *The General Assembly*, convened by the President on the occasion of an International Mycological Congress. All Congress registrants can participate and vote at the General Assembly, which has no continuing responsibility. Votes taken at a General Assembly are subject to ratification by two-thirds of the Affiliated Associations, each of which should nominate one representative to act in this capacity.

   3.2. *The Executive Committee*, composed of (a) a minimum of twelve but not more than sixteen members elected by the General Assembly from nominations received from Affiliated Associations, Individual Members, or the Executive Committee; and (b) the Officers.

   3.3 *The Officers*, comprising a President, two to four Vice-Presidents, a Secretary-General and a Treasurer.

   The Officers are elected by the General Assembly on the nomination of the Executive Committee. When necessary in the period between two General Assemblies the Executive Committee may itself appoint any of these Officers.

   The term of office of each Officer terminates at the close of an International Mycological Congress, with the exception of the Secretary-General and Treasurer who may be re-elected without restriction.

   3.4 *Committees* for special purposes may be appointed by the General Assembly or the Executive Committee.

4. The Executive Committee ensures that the affairs of the IMA are conducted in accordance with the decisions of General Assemblies.

Membership

5.1 Membership of the IMA is open to (a) national or international societies, associations or other groups having mycological interests, and (b) individuals having mycological interests. Such memberships shall be recognized as Affiliated Associations and Individual Members respectively.

5.2 New Affiliated Associations are recognized by the Executive Committee by a majority vote.

5.3 Honorary Presidents may be elected by the General Assembly on the proposal of the Executive Committee, provided that the number at any given time does not exceed five. Honorary Presidents are elected for life and are not required to pay dues.

Finance

6.1 The income of the IMA consists of (a) subscriptions from Affiliated Associations and Individual Members, (b) contributions from International Mycological Congresses, (c) donations, and (d) interest on funds held.

6.2 The expenses of the IMA consist of (a) administrative expenses of the Officers, and (b) all other expenses approved by the Executive Committee.

6.3 The subscriptions of an Individual Member shall be 1 unit and that of an Affiliated Association shall be 0.02 units multiplied by the total number of members in the Affiliated Association. The value of the unit is fixed by the General Assembly on the recommendation of the Executive Committee, subject to ratification as in 3.1.

6.4 The subscriptions of Affiliated Associations are due annually. Those of Individual Members become due at each International Mycological Congress and cover the period to the next Congress.

6.5 An Affiliated Association two years in arrears, or an Individual Member who has not paid the subscription due within two years of an International Mycological Congress, shall, on notice having been given by the Treasurer, be disaffiliated.

6.6 Administration of the funds of the IMA is the responsibility of the Treasurer who shall present accounts annually to the Executive Committee and also to the General Assembly at each International Mycological Congress. The accounts shall be audited by two auditors nominated by the Executive Committee but who are not members of that Committee or Officers of the Association.

Statutes

7. The Statutes of the IMA can be modified only by a majority of two thirds of those present at a General Assembly. Any proposals to modify the Statutes must be received by the Secretary-General at least six months before the Assembly and shall be circulated to Affiliated Associations and Individual Members at least three months before the Assembly. In cases of extreme urgency, the Executive Committe shall have the right to modify the Statutes until the following General Assembly which shall have the right to approve or reject the changes.

8. A motion to dissolve the IMA must be approved by a two-thirds majority of those present at a General Assembly and at which nominated representatives of at least half of the Affiliated Associations must be present. If the IMA is dissolved the balance of any funds is to be used for scientific purposes in the field of mycology as agreed by the dissolving General Assembly.

September 1983

D.L. HAWKSWORTH
Secretary-General IMA

APPENDIX II

EXECUTIVE COMMITTEE 1983-90

Honorary Presidents:	G.C. Ainsworth (UK) C.J. Alexopoulos (USA)
President:	J. Webster (UK)
Vice-Presidents:	K. Esser (Germany) M.V. Gorlenko (USSR) E.G. Simmons (USA) K. Tubaki (Japan)
Secretary-General:	D.L. Hawksworth (UK)
Treasurer:	H.A. van der Aa (Netherlands)
Executive Committee:	L.R. Batra (USA) A. Bresinsky (Germany) I.A. Dudka (USSR) M. Galun (Israel) G. Guzman (Mexico) L. Holm (Sweden) K. Iwata (Japan) S.-C. Jong (USA) C. Kurtzman (USA) A. Peerally (Mauritius) G.F. Pegg (UK) J.I. Pitt (Australia) C.J. Rabie (South Africa) M.A. Rifai (Indonesia) A.K. Sarbhoy (India) R.A. Shoemaker (Canada)

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A NEW SPECIES OF ENDOGONACEAE: GLOMUS BOTRYOIDES

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AND

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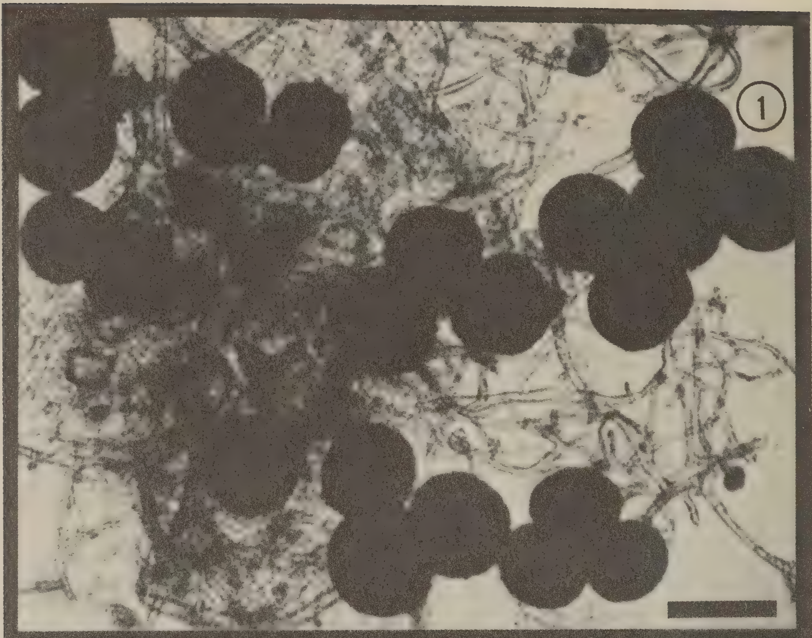
Approximately 85 percent of the land area in the Appalachian Region that is being mined for coal is occupied by mixed hardwood forests (Vogel 1981). A number of the native tree species that are planted or volunteer on surface-mined sites readily form mycorrhizae with members of the Endogonaceae (Rothwell and Vogel 1982). Many of these fungi produce diminutive subterranean sporocarps which serve as a food source for mice and other small mammals, and it is presumed that the majority of spores are dispersed by mammalian mycophagists (Maser et al. 1978, Trappe and Maser 1976). Resident mammals in adjacent unmined areas probably are active vectors in the colonization of endophytes on newly vegetated mine sites. For example, cricetine mice have been trapped on freshly seeded mine sites up to 119 meters from protective cover (Rothwell and Holt 1978).

The new species of *Glomus* described was found in the stomach contents of an eastern chipmunk (*Tamias striatus* L.) and a whitefooted mouse (*Peromyscus leucopus* Raf.) which were trapped in a forested wildlife management area in central Kentucky.

GLOMUS BOTRYOIDES Rothwell and Victor sp. nov. (Figs. 1-5)

Chlamydosporae in laxe intexto peridio, peridiales hyphae frequenter bifurcatae, diametro mutabili, aliquando ad 60-80 µm latae cum muris ad 20 µm crassis; sporae singulae vel frequentius artae uvae sporarum ex auctis finibus hyphae, subglobosae vel globosae, 145-250 µm in diametro, spadiceae vel nigrae in maturitate. Muri sporarum 5-7 µm crassi cum duobus laminis murus exterior fulvus, 3-5 µm crassus, densatus ad hypham affixam (ad 20 µm) et patens in hypha affixa in parvo spatio, exterior superficies asperata, fragilis et facile separabilis cum premitur in maturitate; interior murus laminatus, circa 2 µm crassus, cum parvis proiectionibus ad 1.0 µm longis et inaequaliter distributus in exteriore superficie. Hyphae affixae rectae vel recurvatae, locus adligationis frequenter inflatus, 38-45 µm in diametro, decrescens ad 20-35 µm in diametro cum flavis vel fulvis muris 4-6 µm crassis.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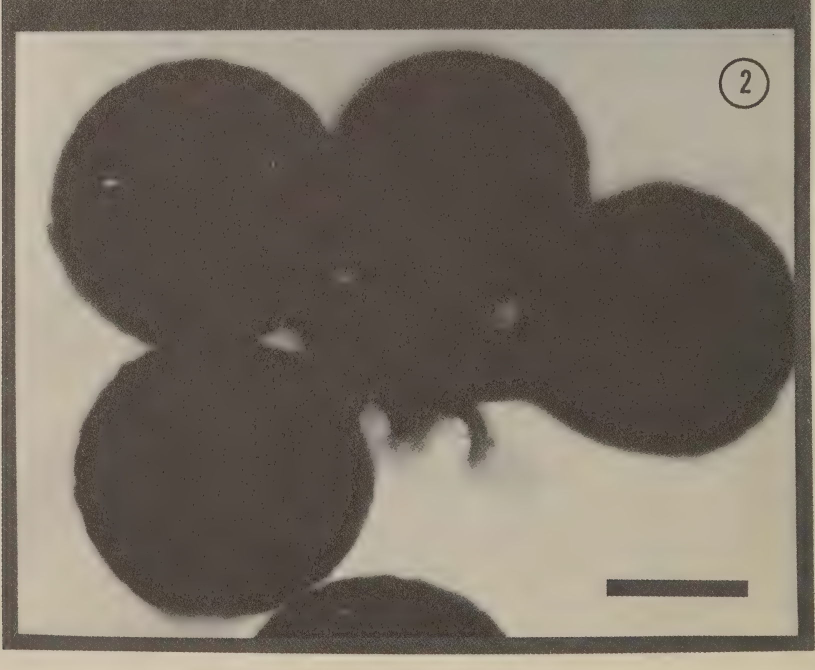
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Chlamydospores borne within a loosely interwoven peridium, the peridial hyphae frequently bifurcate, of variable diameter, some up to 60-80 µm in width with walls to 20 µm thick; spores occur singly, or more frequently as tight clusters of spores formed from swollen endings of a hypha, subglobose to globose, 145-250 µm in diameter; reddish-brown to black at maturity. *Spore wall structure* consisting of two walls; the outer wall yellowish-brown, 3-5 µm, thickened near the hyphal attachment (up to 20 µm) and extending along the attached hyphae for a short distance, outer surface roughened, becoming fragile and readily separable under pressure on mature spores; the inner wall laminated, ca. 2 µm thick, with fine projections up to 1 µm long and unevenly distributed over the outer surface. *Attached hyphae* straight to recurved, point of attachment frequently inflated, 38-45 µm in diameter, tapering to 20-25 µm in diameter with yellow to yellow-brown walls 4-6 µm thick.

OCCURRENCE AND HABITAT: Observed in wet-sieved stomach contents of small mammals that were trapped in a wildlife managment area in which oak was the predominant plant cover.

MYCORRHIZAL ASSOCIATIONS: Unknown.

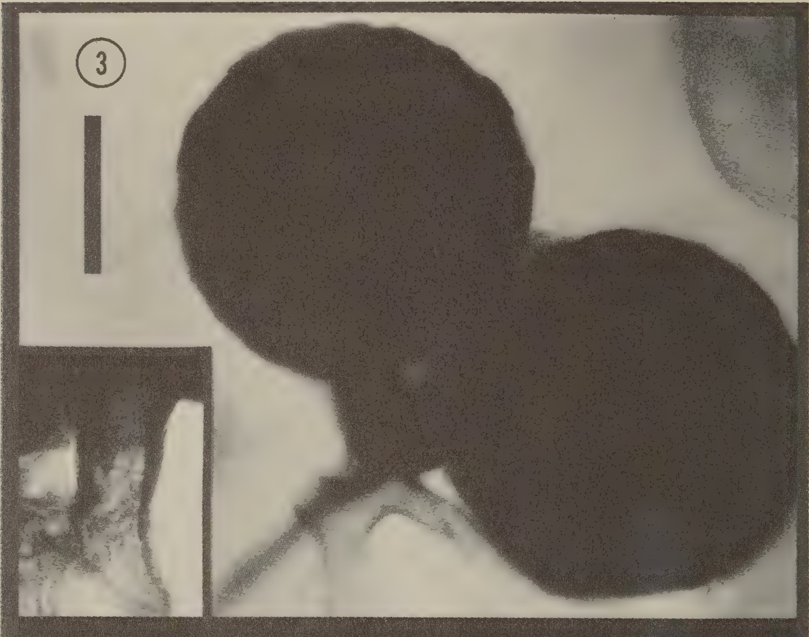
ETYMOLOGY: Greek, *botryoides*, referring to the grape-like clusters of spores.

COLLECTIONS: TYPE: KENTUCKY, Jackson County, Daniel Boone National Forest, August, 1982. Collections have been deposited in the herbaria of Oregon State University (HOLOTYPE: OSC Trappe 7219) and University of Florida (ISOTYPE: FLAS F53644).

Walker (1983) has recently proposed a standardized form of graphic representation of wall structure in the Endogonaceae. The murograph shown in Figure 5 has been suggested by Koske (personal communication) as representing the spore wall structure for *Glomus botryoides*.

This species superficially resembles *Glomus constrictum* Trappe, but spores differ in having a roughened surface, a separable outer wall, and in often forming in tight clusters from bulbous endings of hyphae. Other dark-spored *Glomus* species with which this species might be confused, either because of color or overlapping spore sizes, are: *Glomus geosporum* (Nicolson and Gerdemann) Walker, which is not sporocarpic, and has spores which are formed only singly in soil; *G. halonatum* Rose and Trappe, has spores with a hyaline outer wall and light brown inner wall that collectively measure 18-35 µm; *G. melanosporum* Gerdemann and Trappe, although sporocarpic, spores are enclosed in hyphal envelopes and have a hyaline inner wall; and *G. multicaule* Gerdemann and Bakshi, which occurs singly in soil, has rounded projections over the entire surface of outer wall, and has more than one hyphal attachment per spore.

Figs. 1-2. *Glomus botryoides*. 1. Tight clusters of spores enclosed within peridial hyphae. Bar = 200 µm. 2. Typical botryoid form of spore formation. Bar = 100 µm.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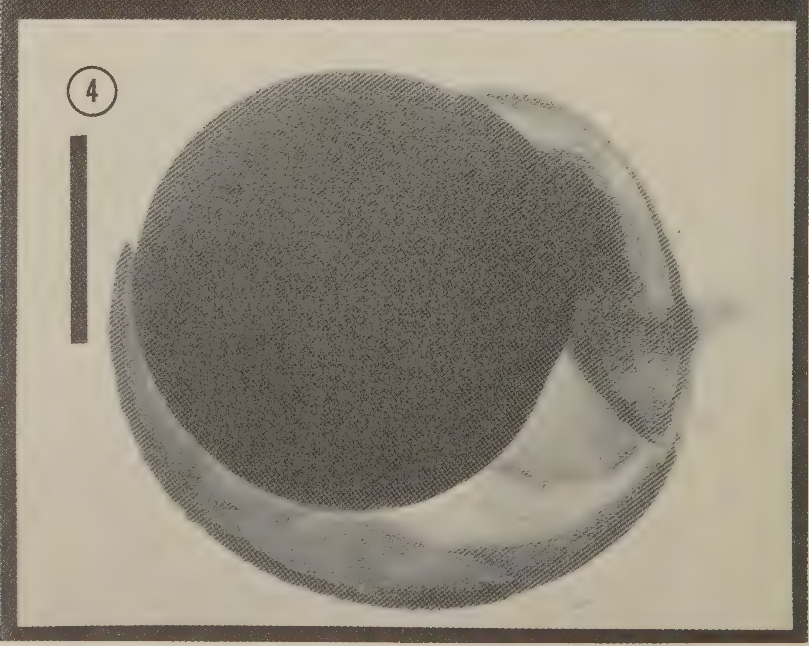
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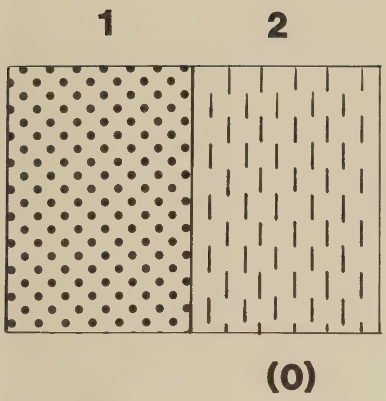

Figure 5: Murograph of *Glomus botryoides*

ACKNOWLEDGMENTS

We gratefully acknowledge the assistance of Dr J E Shelton, Department of Classics, University of Tennessee, for providing the Latin description. We especially want to thank Dr N C Schenck, Dr J M Trappe and Dr R E Koske for their helpful suggestions and critical review of the paper.

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Figs. 3-4. *Glomus botryoides*. 3. Two spores with roughened surface of outer wall evident. Insert shows extension of outer wall on attached hypha. Bar = 100 µm. 4. Fragile outer wall of a mature spore (separating only following application of pressure on mature spores). Bar = 75 µm.

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STUDIES IN THE GENUS STROSSMAYERIA (HELOTIALES). 1. GENERIC DELIMITATION. 2. TWO LOST SPECIES. 3. THREE EXCLUDED SPECIES

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ABSTRACT

1. **Strossmayeria** Schulzer (= **Leptobelonium** Höhn.) is a genus of tiny, pale-colored, sessile, inoperculate discomycetes assignable to the Helotiales, Leotiaceae. It is always accompanied by anamorphs of the genus **Pseudospiropes** Ellis (a segregate of **Helminthosporium** Link : Fr.), and both usually occur on decorticated wood or rarely on culms of large grasses or bamboos. Apothecia are characterized by long-celled, gelatinized ectal excipular tissues that blue in iodine solutions (e.g., Melzer's Reagent), hyalophragmosporous ascospores that also blue in such reagents, and ascal pores that do not react with iodine.

2. The type specimen of the type species of **Strossmayeria**, **S. rackii** Schulzer (a superfluous name for **Peziza heterosperma** Schulzer described from the same collection), has apparently been lost. A neotype should be selected, preferably a topotype from the Vidor Forest, near Zagreb, Yugoslavia. The type specimen of **Lecanidion album** Cr. & Cr., which would provide the oldest known epithet for any species of **Strossmayeria**, is also apparently lost, and a neotype should be selected from topotype material from the province of Finistère, France.

3. Studies of the type specimens of all 8 species names

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[1] Present address: Jardín Botánico de Caracas, Apartado 2156, Caracas 1010, Venezuela. Based in part on a thesis submitted to the Graduate School of Cornell University in partial completion of the requirements for the degree of Master of Science.

assigned to **Strossmayeria** reveal that three cannot be accommodated there: **S. phaeocarpa** Dennis may possibly be a species of **Pezicula; S. viridi-atra** (Sacc. & Fautr.) Dennis is a later synonym of **Claussenomyces prasinulus** (Karst.) Korf & Abawi; the type specimen of **S. sphenospora** (Kirschst.) Dennis is probably assignable to the Dermateaceae, but is in such poor condition that no generic position is proposed here.

RESUMEN

1. **Strossmayeria** Schulzer (= **Leptobelonium** Höhn.) es un género de pequeños, pálidos, sésiles e inoperculados discomycetes, asignables a los Helotiales, Leotiaceae. Se encuentra siempre acompañado por anamorfos del género **Pseudospiropes** Ellis (un segregado de **Helminthosporium** Link : Fr.); ambos usualmente habitan en madera decorticada o raramente en hierbas altas o bambú. El apotecio se caracteriza por tener: (a) un excípulo ectal gelatinazado, formado por células largas y tornándose azul en soluciones de yodo (reactivo de Melzer's); (b) ascasporas hialofragmosporas, las cuales también se tornan azules en dichos reactivos; (c) poro del asca no reaccionando con yodo.

2. El especímen tipo de la especie tipo del género **Strossmayeria, S. rackii** Schulzer (nombre supérfluo para **Peziza heterosperma** Schulzer, descrito de la misma colección), aparentemente se encuentra perdido. Un neotipo debe ser seleccionado, o preferiblemente un topotipo del bosque Vidor, cerca de Zagreb, Yugoslavia. El especímen tipo de **Lecanidion album** Cr. & Cr., el cual proporcionaría el epíteto más viejo conocido para las especies de **Strossmayeria,** también aparentemente se encuentra perdido; y así mismo, un neotipo debería de ser seleccionado de material topotipo de la provincia de Finistère, Francia.

3. Estudios de los especímenes tipo de las 8 especies asignadas al género **Strossmayeria,** revelan que tres de ellas no pueden ser acomodadas en dicho género: **S. phaeocarpa** Dennis que posiblemente es una especie del género **Pezicula; S. viridi-atra** (Sacc. & Fautr.) Dennis que es un sinónimo (posterior) de **Claussenomyces prasinulus** (Karst.) Korf & Abawi; y por último el especímen tipo de **S. sphenospora** (Kirschst.) Dennis que es asignable probablemente a la familia Dermateaceae, pero se encuentra en tan malas condiciones que no se otorga posición genérica para dicha especie.

1. Generic Delimitation

Strossmayeria Schulzer is a genus of pale-colored, subsessile, inoperculate discomycetes with apothecia approximately 1/2 mm in diameter. The genus is assigned to the Helotiales, Leotiaceae. Its species are saprophytes on decorticated wood, or rarely on large grasses and bamboos. The apothecia occur together with their anamorphs, hyphomycetes belonging to the genus **Pseudospiropes** Ellis.

Eight species have been assigned to the genus **Strossmayeria:** **S. rackii** Schulzer, **S. basitricha** (Sacc.) Dennis, **S. viridi-atra** (Sacc. & Fautr.) Dennis, **S. sphenospora** (Kirschst.) Dennis, **S. phaeocarpa** Dennis, **S. josserandii** (Grelet) Bertault, **S. longispora** Raitviir, and **S. ostoyae** Bertault.

From 1881, when the generic name **Strossmayeria** was proposed (Schulzer, 1881), until 1932 the genus was essentially forgotten. Nannfeldt (1932) picked up the name and indicated that it was a monotypic genus. At that time he also indicated that **Leptobelonium** Höhn., based on **L. helminthicola** (Blox.) Höhn., was surely a later synonym.

Dennis (1960a) made the combination **S. basitricha** for **Belonidium basitrichum** Saccardo (1875), noting that it occurs in association with **Helminthosporium simplex** Kunze : Fr. His concept of the genus expanded when he published **S. phaeocarpa** Dennis (1960b), a new species from Venezuela, which he described as being on "a mixture of Dematiaceous moulds including a species of **Helminthosporium.**" Soon after he expanded the genus again, publishing two new combinations, for neither of which the presence of any anamorph was noted. These were **S. viridi-atra** (Sacc. & Fautr.) Dennis (1962), made "judging by the description" of **B. viridi-atrum** Saccardo & Fautrey (1900), and **S. sphenospora**, based on **B. sphenosporum** Kirschstein (1938) which Dennis (1962) thought "then probably ... is also a **Strossmayeria.**"

Raitviir (1968) described the new species **S. longispora**, without mentioning the occurrence of any anamorph, though I have found a **Pseudospiropes** present on the type specimen. Bertault (1970) published the new combination **S. josserandii** and the new species **S. ostoyae**. Each was associated with a dematiaceous mould which he called, respectively, **Helminthosporium josserandii** Bertault and **H. ostoyae** Bertault, both new anamorph species.

My studies of **Strossmayeria** revealed that the anamorphs present with the species I now accept in the genus are better referred to the genus **Pseudospiropes** Ellis (**1971**), one of the many segregate genera now recognized from the heterogeneous **Helminthosporium** Link : Fr. sensu lato. Independently, Prof. E. Müller and P. Raschle (Switzerland) apparently had arrived at the same conclusion (pers. comm.).

The genus **Strossmayeria** is characterized by pale, sessile to subsessile apothecia that extrude a yellow pigment when mounted in 2% aqueous KOH, by an ectal excipulum blueing completely or partially in Melzer's Reagent, by hyalophragmosporous ascospores that also blue in that reagent, by failure of the ascus pore to react to Melzer's Reagent, with or without pre-treatment in KOH, and by constant association with a **Pseudospiropes** anamorph. The genus appears to occupy an isolated position within the Leotiaceae, and is easily recognized by the above combination of characters. Blueing of the ectal excipulum in iodine reagents is rare in the family, and blueing of ascospores even rarer; no other genus of discomycetes is known to possess a **Pseudospiropes** state [the presumed connection of a **Pseudospiropes** to the pyrenomycetous **Melanomma subdispersum** (Karst.) Berl. & Vogl. (Ellis, **1976**) merely reflects the still unsatisfactory taxonomic limits of the anamorphic genus].

I provide here a provisional description of the genus:

Status Teleomorphosis

STROSSMAYERIA Schulzer von Müggenburg, Oesterr. Bot. Z. **31**: 313. 1881, **emend.** Iturriaga

Holotype: **Peziza heterosperma** Schulzer, Oesterr. Bot. Z. **28**: 320. 1878 (= **Strossmayeria rackii** Schulzer, Oesterr. Bot. Z. **31**: 313. 1881, a superfluous name based on the same specimen).

= **Leptobelonium** Höhn., Akad. Wiss. Wien Sitzungber., Math.-Naturwiss. Kl., Abt. 1, **132**: 112. 1923.

Holotype: **Peziza 'helminthicola'** Blox. in Höhn.

Apothecia superficial, sessile or with a very short pseudostipe, up to 1 mm diam, bowl- to cup-shaped. Receptacle white, whitish, light brown, yellowish-white, or cream colored, darker towards the base. Disco concolorous with the receptacle or paler, pruinose to granulose. Hymenium hyaline. Ectal excipulum hyaline but usually brownish in the outermost layers, all or in part J+ (amyloid blue reaction to Melzer's Reagent), of textura oblita with glassy walls, composed of thin, parallel hypahe 1.5- 3 µm wide. Base of the excipulum composed of rounded, dematiaceous cells. Medullary excipulum and subhymenium indistinguishable from ectal excipulum. Paraphyses long and slender, with swollen tips, hyaline, simple or divided. Asci clavate, hyaline, unitunicate, arising from croziers. Ascospores cylindric- clavate, hyaline, more than 2-septate, biseriate or multiseriate, J+, surrounded by a thin layer of gel. Anamorph present: **Pseudospiropes.**

Status Anamorphosis

PSEUDOSPIROPES Ellis, Dematiaceous Hyphomycetes, p. 258. 1971.

Holotype: **Helminthosporium nodosum** Wallr.

Conidiophore macronematous, mononematous, arising from a mass of rounded or elongated brown cells, simple, slightly flexuous or flexuous, thick-walled, septate, brown, lighter towards the apex. Conidiophore base swollen. Conidiogenous cell polyblastic, integrated, terminal or intercalary, sympodial, cylindrical flexuous, bearing protruding, cicatrized scars, lighter than the rest of the conidiophore. Conidia solitary, dry, acropleurogenous, simple, fusiform, truncate at the base, tapering toward the apex, dematiaceous, 5- to 10-septate or pseudoseptate.

2. Two Lost Species

The type specimens of two species names clearly referable to the genus **Strossmayeria** appear to be lost, and neotypes should be designated for both.

Peziza heterosperma (≡ Strossmayeria rackii)

Strossmayeria rackii Schulzer, the type species of the genus, was described as occurring together with **Helminthosporium gongrotrichum** Corda, and was collected in the Vidor Forest, near Zagreb (Yugoslavia). The epithet "rackii" is superfluous, since three years earlier Schulzer had described the fungus in almost exactly the same words as a new species, **Peziza heterosperma** Schulzer, Oesterr. Bot.

Z. **28:** 320, 1878. Schulzer himself acknowledged the intentional name change in his unpublished notes (obtained through the courtesy of Dr. Milica Tortić, University of Zagreb), in which he had crossed out the name **Peziza heterosperma** and overwritten **Strossmayeria rackii.** He noted there that he had "tentatively" published it in 1878 as **P. heterosperma,** with a full diagnosis, and again in 1881 in the same journal as **S. rackii.** Schulzer's herbarium apparently no longer exists as a unit, and his specimens are difficult if not impossible to locate (M. Tortić, pers. comm.). Attempts to locate this type material in any Yugoslavian herbarium met with failure. Though portions of it were sent to Bresadola and to Quélet, no trace can now be found in Bresadola's herbarium at Stockholm, and Quélet's herbarium has apparently not survived. A neotype should undoubtedly be designated, preferably a topotype, but I shall avoid doing so until such suitable material becomes available. In all likelihood Schulzer's **P. heterosperma** is a later synonym of **Belonidium basitrichum** Sacc.; selection of a neotype would not upset the currently accepted name, **Strossmayeria basitricha** (Sacc.) Dennis.

Lecanidion album

Lecanidion album Cr. & Cr., Florule du Finistère, p. 75, 1867, described as occurring with a **Helminthosporium,** would provide the oldest known epithet for any species of **Strossmayeria.** The Crouan brothers' specimens are deposited at Concarneau, France (CON). Since the specimens from this herbarium may not be loaned, a visit was made by R.P. Korf to locate the specimen and to decide upon its taxonomic position. Unfortunately he was unable to find the specimen amongst the uncatalogued and generally unarranged collection. A neotype specimen should be designated, preferably a topotype from the province of Finistère. It is probable that this species also is a synonym of **S. basitricha,** as already suggested by von Höhnel (**1909**). Should this be the case, a new combination in **Strossmayeria** would become necessary, and **S. basitricha** would fall into synonymy.

3. Three Excluded Species

The originally monotypic genus **Strossmayeria** has grown by accretion to include eight species. Three of the seven more recently assigned species fail to agree with the type species, **S. rackii**, in major features: all three lack a **Pseudospiropes** anamorph, none have ascospores nor excipular tissues that blue in Melzer's Reagent, two have an ascal pore that blues in that reagent, and only one has an excipular structure similar to that in **Strossmayeria** species.

1. **Strossmayeria phaeocarpa** Dennis, Kew Bull. 14: 433. 1960.

Holotype specimen examined: **Strossmayeria phaeocarpa** Dennis, on bamboo. Cloud forest, 2000 m, El Avila, Dto. Federal. Venezuela. R.W.G. Dennis # 1817. 17 August 1958. 1960. (K)

Apothecia brown with a white margin, on dead bamboo culms, gregarious, sphaerical when young, saucer-shaped and of irregular contour when mature, accompanied by an imperfect fungus of the genus **Clasterosporium**, sessile, 0.25-1 mm diam, no extrusion of yellow substance in 2% aqueous KOH. Disc greyish-brown, pruinose, flat. Receptacle dark brown, margin slightly involute. Stipe none. Hymenium yellowish to light brown, approximately 150 µm thick. Ectal excipulum brown, composed of thin, brown, parallel hyphae 2-4 µm wide, with thick walls, forming a textura oblita, J-. Base composed of brown cells forming a textura epidermoidea. Medullary excipulum and subhymenium indistinguishable. Paraphyses the same length or slightly longer than the asci, cylindrical, blunt to slightly rounded at the apex, hyaline, 2.2-3.7 µm wide, simple, not septate, not forming an epithecium. Asci cylindrical, thick-walled, the wall 1.5 µm wide, 58.7-112 x 7.3-13.1 µm, arising from croziers, pore J+ dark blue. Ascospores cylindrical, sometimes constricted at the septa, hyaline at first, later turning light brown to brown (Dennis: "hyaline or nearly so when examined fresh but distinctly brownwalled in dried material"), biseriate, J-, 15.4-22.7(-30.3) x 4.4-7.3 µm, 3-5-septate (mostly 3-septate), very rarely 9-10-septate with the additional septa fainter and lighter colored than the rest. Associated **Clasterosporium:** conidiophores dark brown, septate, very short, 3.5-5.9 µm wide; conidia cylindrical or funnel-shaped, blunt at both ends, brown, (26.4-)33.1-67.0 x 5.9-7.3 µm, 6-10-septate; hyphopodia irregular in shape, lobate.

Notes: This species from Venezuela is not a **Strossmayeria**, differing in the J- ectal excipulum, J- ascospores, shape and color of the ascospores, J+ ascal pore, and an associated **Clasterosporium** imperfect and lack of a **Pseudospiropes** anamorph. Though Dennis reported the apothecia to be "on a brown mycelium, apparently belonging to a mixture of Dematiaceous moulds, including a species of **Helminthosporium**", neither a **Helminthosporium** nor a **Pseudospiropes** was found on the fragment of the type specimen sent by Kew on loan. It is possible Dennis took the **Clasterosporium** conidia for those of a **Helminthosporium**. Because of the poor state of preservation, several of the microscopic structures could not be adequately studied, and a generic assignment could not be made. The species is probably a member of the Dermateaceae, but the ectal excipulum has longer hyphae than those characteristic of that family. It is possibly a member of the genus **Pezicula**.

2. Strossmayeria viridi-atra (Sacc. & Fautr.) Dennis, Persoonia 2: 188. 1962.

≡ **Belonidium viridi-atrum** Sacc. & Fautr., Bull. Soc. Mycol. France **16**: 22. 1900.

Holotype specimen examined: **Belonidium viridi-atrum** Sacc. & Fautr. # 45, in ligno putri **Quercus**. Côte-d'Or, Galia. 1899. (PAD)

Apothecia black (dry), greenish-black (rehydrated), spherical when young, disc-shaped when mature, sessile, up to 1 mm in diam, but usually 0.5 mm in diam, accompanied by an imperfect fungus, **Brachysporium bloxamii** (Cooke) Sacc. A small amount of yellowish substance extruded in 2% aqueous KOH. Disc greenish-black, pruinose. Receptacle concolorous with disc, margin irregular, involute when young and then opening. Stipe none. Hymenium greenish-yellow, 168–178 µm thick. Ectal excipulum greenish-yellow, J–, embedded in a gelatinous matrix. Paraphyses difficult to distinguish, embedded in copious gel. Asci clavate, unitunicate, (56–)71–86 x 5.6–9.3 µm, probably arising from croziers, J–. Ascospores cylindrical to slightly curved, sometimes clavate, hyaline, often constricted at the septa, biseriate, 8 per ascus, 7.3–10.2 x 1.5–2.2 µm, 3-septate, J–, surrounded by gel, budding in the ascus. Associated **Brachysporium bloxamii**: conidiophores brown, lighter towards the apex, long and straight, smooth, (1.5–)2.9–6.6 µm wide, base wider, 7.3–12.4 µm wide; conidia pyriform, brown, (19–)22.0–24.2 x 7.3–11.0 µm, 3-septate, all four cells dark, or two extreme ones lighter, or just the basal cell lighter.

Notes: The greenish-black apothecia immediately lead one to suspect that this is **Claussenomyces prasinulus** (Karst.) Korf and Abawi, which is confirmed in observing the textura angularis of the ectal excipulum, the abundant gel, and the budding of the ascospores. The associated hyphomycete, **Brachysporium bloxamii**, presumably has nothing to do with the life cycle of the **Claussenomyces**. Dennis's assignment of this species to **Strossmayeria** was an error. He presumably had not examined the type specimen at the time he made the new combination, and based it solely on the brief, original description. **Belonidium viridi-atrum** and **Strossmayeria viridi-atra** should be added to the already extensive synonymy of **C. prasinulus** given by Korf and Abawi (1971).

3. **Strossmayeria sphenospora** (Kirschst.) Dennis, Persoonia 2: 188. 1962.

≡ **Belonidium sphenosporum** Kirschst., Ann. Mycol. **36**: 375. 1938.

Holotype specimen examined: **Belonidium sphenosporum** Kirschst., Grossbenitz, Westhavelland. Auf einer alten entrindeten Kieferstange. Oktober 1916. (B); Isotype: (FH).

Apothecia yellowish to light brown, on decorticated wood, gregarious, saucer-shaped, erumpent but sometimes very flat due to preservation, 0.25-0.75 mm diam. Excipulum of textura globulosa to textura angularis, J-, poorly preserved, no details of subhymenium or medullary excipulum seen. Asci poorly preserved, only a few young asci with J+ pores observed. Ascospores clavate, 3-septate, measurements differing between holotype and isotype: holotype, 14.6-22 x 2.2-3.7 µm; isotype, 7.3-12.4 x 2.9-3.7 µm.

Notes: Though the labels on the holotype and isotype are almost identical, the difference in ascospore size noted is unexplained. Both portions are in a state of poor preservation, and little can be said about its generic position other than to be certain that it is not a species of **Strossmayeria**. The ectal excipular characters suggest that it may best be placed in the Dermateaceae, though the cell walls are not dark. The J- ascospores, J- ectal excipulum, and J+ ascal pore all point to the clear exclusion of this species from **Strossmayeria**. It is probable that Dennis had not examined type material at the time he proposed his new combination.

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STUDIES IN THE GENUS STROSSMAYERIA (HELOTIALES).
4. CONNECTION TO ITS ANAMORPH, PSEUDOSPIROPES

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ABSTRACT

The constant association on decorticated wood of tiny, sessile discomycetes (now placed in the genus **Strossmayeria** Schulzer) with anamorphs assignable to **'Helminthosporium'** (i.e., **Pseudospiropes** Ellis) was noted long ago, and whether they represented different morphs of a single species or one fungus parasitic on another were subjects of speculation. Single-ascospore cultures of five collections referable to at least two species of **Strossmayeria** consistently yielded cultures belonging to the genus **Pseudospiropes**, proving these to be teleomorphs and anamorphs, respectively, of the same holomorphs. Production of apothecia of these species in axenic culture has not yet been achieved.

RESUMEN

La asociación constante de pequeños y sésiles discomycetes (hoy referidos al género **Strossmayeria** Schulzer) con anamorfos correspondientes a **'Helminthosporium'** (i.e., **Pseudospiropes** Ellis) ha sido observada desde hace tiempo, aunque era objeto de especulación de si representaban diferentes formas (morfos) de una misma especie o un hongo ere parásito del otro. Cultivoa individuales de ascasporas de cinco recolecciones (representando al menos 2 especies) de **Strossmayeria** produjeron consistentemente cultivos pertenecientes al género **Pseudospiropes**, siendo éstos teleomorfos y anamorfos, respectivamente, de los mismos holomorfos. No se ha logrado aún la producción de apotecios de éstas especies en cultivos axénicos.

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An association of tiny, sessile, pale-colored apothecia with colonies of a phaeophragmosporous hyphomycete belonging to the genus **Helminthosporium** Link : Fr. (sensu lato), occurring on decorticated wood, was noted by both early and more recent describers of micro-discomycetes (Table I). Some authors were of the apparent conviction that the apothecial and conidial states were organically connected, parts of a single life-cycle (Schulzer, 1878, 1881; Bertault, 1970), while others speculated on the possibility that one state was instead a parasite on the other (Höhnel, 1909a; Korf, 1952, 1973).

In all cases known to us, the apothecia are referable to the genus **Strossmayeria** Schulzer (Figs. 1, 2), and the conidia to the genus **Pseudospiropes** Ellis (Fig. 3) (Iturriaga, 1984).

The first pure-culture studies of these discomycetes appear to have been performed by the junior author on collections he made in the Ithaca area in the 1960's and 1970's. He had been intrigued by the question of connection vs. parasitism ever since his Ph.D. studies on Arachnopezizeae, in which he stated (Korf, 1952: 173) that he hoped to present a complete treatment of **Strossmayeria**, but that awaited "life-history studies on living material." In those subsequent studies he repeatedly obtained successful ascospore discharge from apothecia suspended on the covers of petri dishes and successful germination of the ascospores on the agar below (usually water agar, with or without antibiotics). He routinely lost his cultures after transfer to nutrient agars in test tube slants before they produced any recognizable anamorph, or they would die after producing only a few conidiophores and conidia.

Quite by accident the junior author discovered that those cultures maintained on Difco Corn Meal Agar (CMA) survived. A series of recent studies by the senior author has confirmed that several different species of **Strossmayeria** grow readily in CMA cultures, but are quickly lost on a variety of other, generally richer, standard culture media.

The junior author's cultures had always been made from mass-ascospore transfers of discharged ascospores, usually soon after ascospore germination had been confirmed by microscopic examination. Despite his obtaining repeated cultures yielding, always, a **Pseudospiropes** anamorph, the technique employed did not ex-

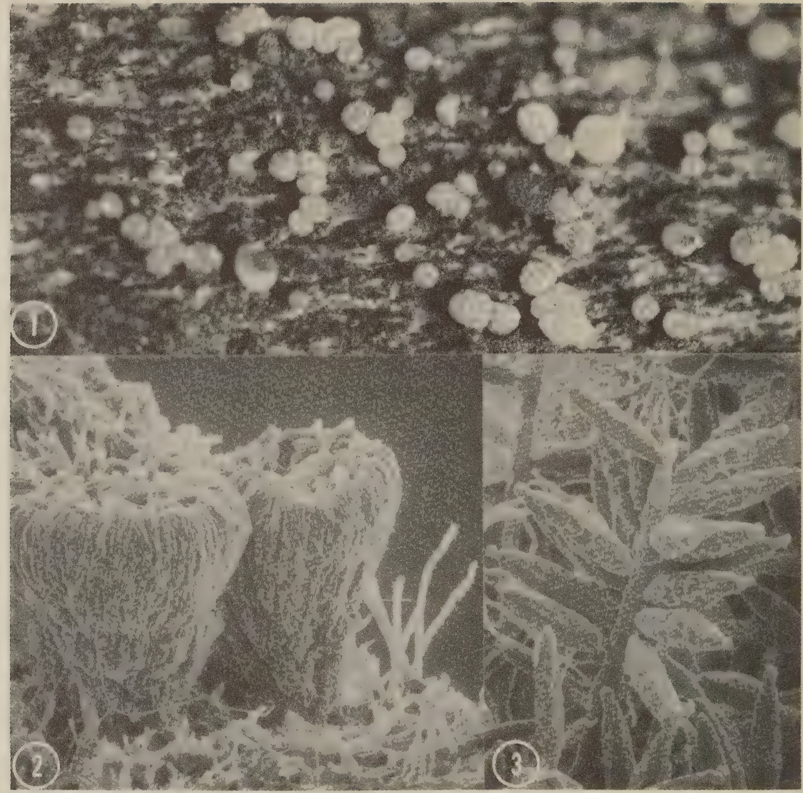
TABLE I

Literature references to reported associations between species with **Strossmayeria** apothecia and **Pseudospiropes** anamorphs

Strossmayeria sp.	**Pseudospiropes** sp.	Association reported:
Peziza helminthosporii Blox. MS	**Helminthosporium** sp.	Berkeley & Broome 1865
= **P. minutissima** Batsch sensu Berk. & Br. (misapplied)	**Helminthosporium** sp.	Berkeley & Broome 1865
= **P. 'helminthicola'** Blox. *in* Höhn.	**H.** ? **fusiforme** Cda.	Höhnel 1909b
Lecanidion album Crouan & Crouan	**Helminthosporium** sp.	Crouan & Crouan 1867
Belonidium basitrichum Sacc.	**Helminthosporium** sp.	Saccardo 1875
	H. belonidium Sacc.	Saccardo 1877
	H. fusiforme Cda.	Höhnel 1909a
= **Strossmayeria basitricha** (Sacc.) Dennis	**H. simplex** Kunze : Fr.	Dennis 1960
Peziza heterosperma Schulzer	**H. 'gonyotrichum'** Cda.	Schulzer 1878
= **Strossmayeria rackii** Schulzer	**H. gongrotrichum** Cda.	Schulzer 1881
Belonidium marchalianum Sacc., Bomm. & Rouss.	**H. apiculatum** Cda.	Bommer & Rousseau 1886
Strossmayeria josserandi (Grelet) Bertault	**H. josserandi** Bertault	Bertault 1970
Strossmayeria ostoyae Bertault	**H. ostoyae** Bertault	Bertault 1970
Strossmayeria longispora Raitviir	**Pseudospiropes** sp.	Iturriaga 1984

clude the possibility that one or more of the conidia of **Pseudospiropes** amongst which the apothecia grow might have fallen to the agar surface and have germinated. According to an unpublished manuscript by Emil Müller and Paul Raschle (pers. comm.), they have also performed similar cultural work with **Strossmayeria** and obtained a **Pseudospiropes** state.

The senior author has undertaken not only a monogra-



Figs. 1-3. **Strossmayeria** sp. (CUP 59716). 1. Apothecia on decorticated wood, x 6.5. 2. Apothecia and conidiophores, SEM, x 225. 3. Conidia and conidiophores, SEM, x 705. SEM photographs from unfixed, freeze-dried material.

phic study of the genus **Strossmayeria** and its allies as a Ph.D. thesis topic, but also undertook the life-history studies needed. By single-ascospore isolations she has established that each species of the genus examined so far has produced without fail a corresponding species of **Pseudospiropes** in culture. Five collections from New York State representing at least two distinct species of **Strossmayeria** were studied in some detail. From each of these collections the author has made from a few to over 30 successful single-ascospore isolations, taken from ascospores discharged onto CMA surfaces and transferred shortly after germination onto 6 cm diam plastic petri dishes containing CMA, and then sealed with Parafilm. Each such single-spore germling has yielded a **Pseudospiropes** colony, which we take as irrefutable evidence of the connection of teleomorph and anamorph. Light microscopic and electron microscopic (TEM and SEM) studies on conidia and conidiogenesis based upon these and other cultures are reported elsewhere (Iturriaga and Israel, 1984).

Many experiments, some started long ago by the junior author using mass-ascospore derived cultures, many done more recently by the senior author using single-ascospore cultures, mass-ascospore cultures, and various combinations of single-ascospore cultures derived from a single apothecium, were performed in an attempt to induce apothecial formation in axenic culture. A variety of artificial media and natural substrata, and a range of temperature and light regimes were tested, some in the laboratory, some in growth chambers. Though we would like to report success (and thus complete Koch's postulates), whatever the physical and cutural factors are that would provide such success have thus far eluded us.

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TWO NEW SPECIES OF THE GENUS PHIALOCEPHALA

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Abstract

In this paper an amendment of the Hyphomycete genus Phialocephala Kendrick (1961) is proposed. Two new species, P. mexicana Onofri et Zucconi sp. nov., found on Coffea arabica L. leaf litter in Mexico, and P. ivoriensis Zucconi et Onofri sp. nov., found on indeterminate leaves in forest litter, Tai, Ivory Coast, are described and illustrated. A key to the members of the genus is given.

Two new species of the Dematiaceous Hyphomycete genus Phialocephala Kendrick (1961) are herewith described. The morphological characteristics were obtained from nature. Every attempt at cultivation on common media proved unsuccessful.

The genus Phialocephala was established by Kendrick (1961) to separate from the genus Leptographium Lagerb. et Mel. (1927) those species which possess conidiophores and general appearance very similar to that of this genus but which produce phialospores instead of anellospores.

During some investigations on the productivity and management of the coffee agro-ecosystems, a new Hyphomycete, belonging to the genus Phialocephala Kendrick, on leaves of Coffea arabica L. in litter, has been discovered.

Phialocephala mexicana Onofri et Zucconi sp. nov.

Coloniae amphigenae, effusae, parum manifestae, non circumscriptae. Mycelium immersum. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel leviter flexuosa, levia, pallide brunnea, comparative brevia, usque ad 54 μm longa, ex stipite et apparatu conidiogeno plus minusve penicilliformi composita. Stipes usque ad 34,5 μm longus, 7-11 μm ad basim crassus et 5,5-8 μm ad apicem, plerumque aseptatus, basi lobata praeditus. Apparatus conidiogenus symmetricus aut asymmetricus, ex apice stipitis ortus; aut 1 ex serie 4-5 metularum (7-11x3,5-5,4 μm), 2-6 phialides quisque ad apicem ferens, aut

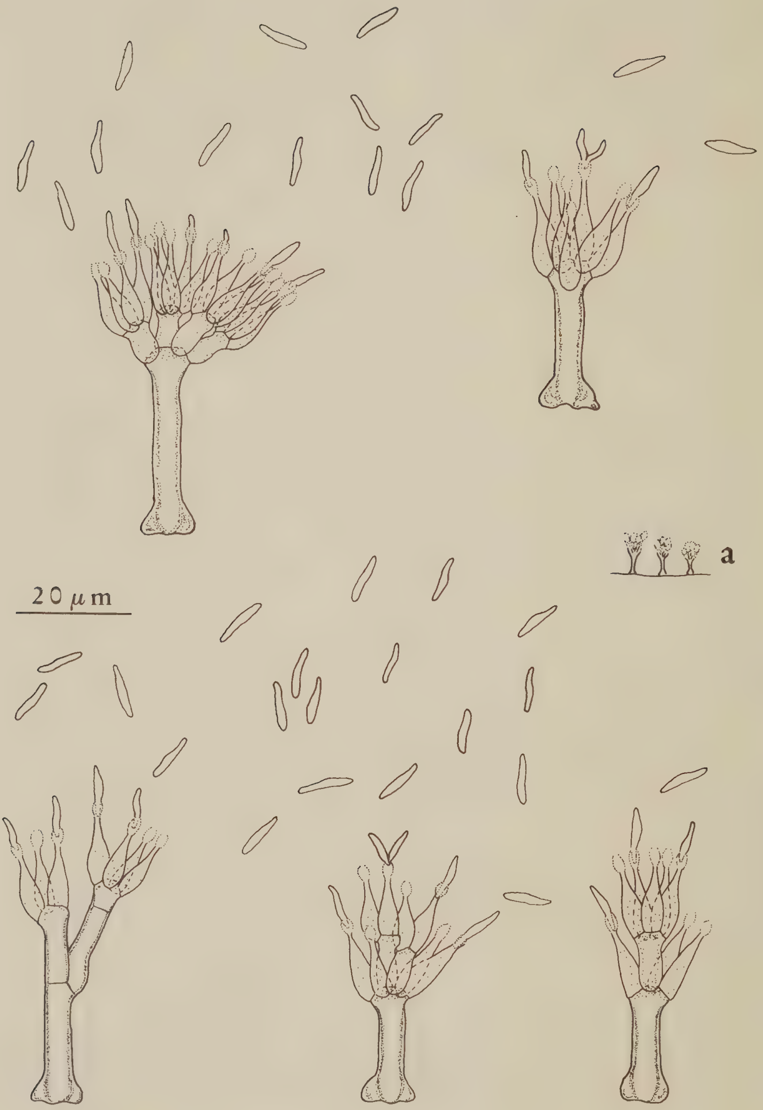


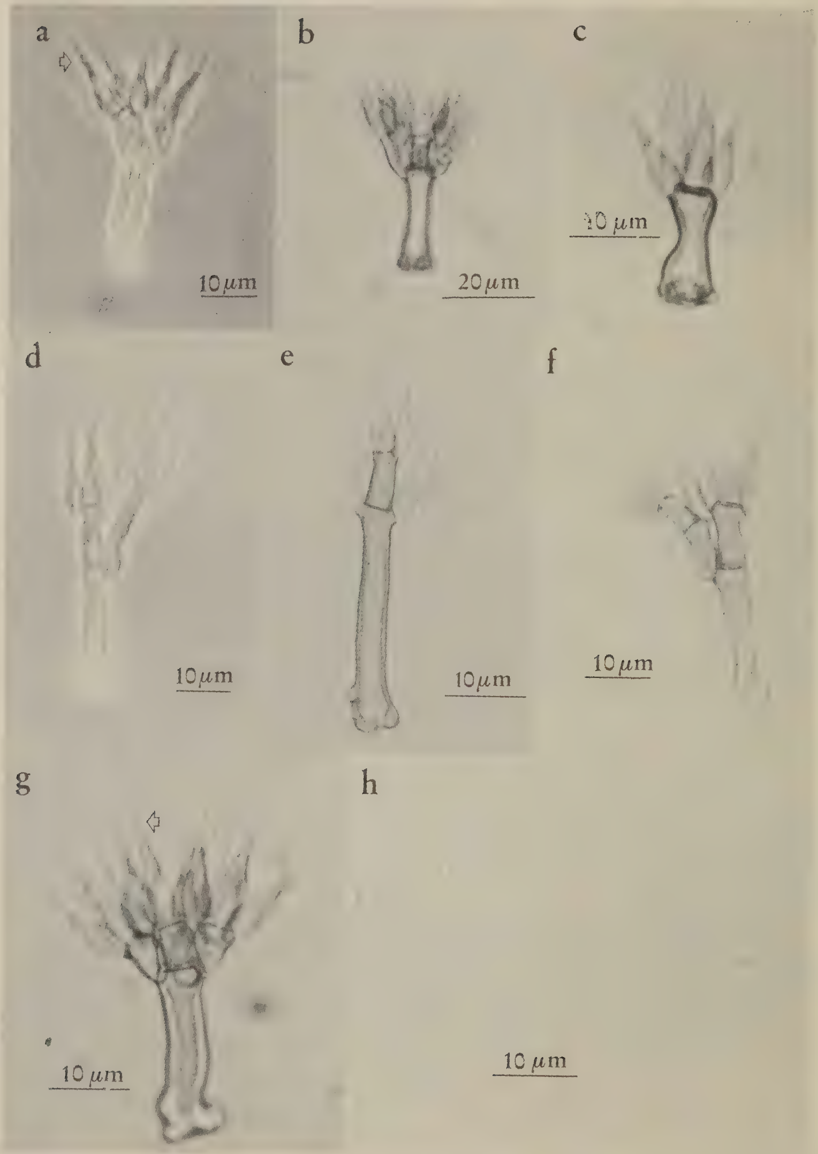
Fig. 1 - Phialocephala mexicana: conidiophores and conidia; a. habit sketch.

3-7 ex phialidibus simpliciter in apice stipitis positis; aut saepius ex metulis et phialidibus in apice stipitis pari altitudinis fastigio, compositus. Stipes a latere ramum, metulis vel phialidibus praeditum, interdum septatum, rarius fert. Cellulae conidiogenae enteroblasticae, monophialidicae, discretae, determinatae, lagoeniformes, parietibus tenuibus, subhyalinae, 12,6-20 μm longae (collarettis additis) et 3,6-5,4 μm crassae, definito collaretto praeditae. Collaretta ellipsoidalia vel ovata, extremitate trunca, vix perspicua; 1,8-2,8x 2-2,5 μm. Conidia aseptata, levia, hyalina, subacerosa, saepe modice incurvata vel modice sigmoidalia, omnia glutinata; 7,2-10x1-1,8 μm.

In foliis emortuis Coffeae arabicae L., situs coffeiculus Xalapensis, Veracruz, Mexico, 16.5.1983, holotypus: H.B.R. 125A

Colonies amphigenous, effuse, scarcely visible, uncircumscribed. Mycelium immersed. Conidiophores macronematous, mononematous, solitary, erect, straight or slightly flexuous, smooth, pale yellowish brown, comparatively short, up to 54 μm long, consisting of a stipe and a conidiogenous apparatus arranged in a more or less penicillate manner. Stipe up to 34.5 μm long, 7-11 μm wide at the base and 5.5-8 μm wide at the apex, generally aseptate, with a lobed base. Conidiogenous apparatus terminal on the stipe, symmetrical or asymmetrical, consisting either of one regular series of 4-5 metulae (7-11x 3.6-5.4 μm), the distal ends bearing each 2-6 phialides, or of 3-7 phialides inserted directly on the stipe, or, more frequently, of metulae and phialides inserted at the same level on the stipe. Rarely, the stipe bears a lateral branch, sometimes septate, on which metulae and/or phialides are inserted. Conidiogenous cells enteroblastic, monophialidic, discrete, determinate, lageniform, thin-walled, subhyaline, 12.6-20 μm long (including collarettes) and 3.6-5.4 μm wide, with a well-defined collarette. Collarettes ellipsoidal to oval, open-ended, scarcely visible, 1.8-2.8x2-2.5 μm. Conidia aseptate, smooth, hyaline, subacerose, often slightly curved or sigmoid, produced in slimy masses, 7.2-10x1-1.8 μm.

The Hyphomycete here described presents phialidic conidiogenous cells with defined collarettes, conidia produced in slimy masses, and solitary conidiophores with a conidiogenous apparatus arranged in a more or less penicillate manner. These are the most taxonomically relevant characteristics of the genus Phialocephala Kendrick (1961). In the original diagnosis of this genus, Kendrick describes a sporogenous head consisting "of from one to several multiplicative series of metulae", and he does not consider phialides inserted directly on the stipe, as sometimes occurs in our fungus. We think that the presence or the absence of the metulae can not be considered in distinguishing between genera, in accordance with what occurs, for example, in Penicillium or in Aspergillus. In fact Sutton (1975) has already included in the genus Phialocephala the species P. fumosa (Ell. et Ev.)


a
b
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e
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h
10µm
20µm
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Fig. 2 - Phialocephala mexicana: a. - g. conidiophores (arrows indicate collarettes); h. conidia.

Sutton, which can present phialides inserted directly on the conidiophores or on metulae. Therefore we think it is necessary, in order to include P. fumosa and P. mexicana correctly in the genus Phialocephala Kendrick, to propose the following amended Latin diagnosis of the genus, also adding to it the amendment already proposed by Crane (1971).

Phialocephala Kendrick (1961)

Fungi Imperfecti, Hyphomycetes.
Conidiophora erecta, solitaria vel raro fasciculata. Stipites mononematei, dematiacei. Apparatus sporogenus obconicus, simplex vel complexus, vel ex apice vel a latere stipitis ortus, ex phialidum verticillo vel 1-pluribus ex seriebus metularum compositus, distaliter phialides ferens. Phialides saepius strophium gaudentes. Phialosporae parvae, unicellulares, saepius hyalinae, ex phialidibus in capitulum mucosum successive extrusae.

Species typica: P. dimorphospora Kendrick

In the above-mentioned paper, Sutton (1975) considers P. fumosa (Ell. et Ev.) Sutton (≡Spicaria fumosa Ell. et Ev.) as a synonym of Sporendocladia castaneae Arnaud (1954, nom. nud.). In the same year Nag Raj and Kendrick (1975) validated the genus Sporendocladia Arnaud ex Nag Raj et Kendrick (type species: S. castaneae Arnaud ex Nag Raj et Kendrick). Subsequently Carmichael et al. (1980) consider the validated genus Sporendocladia as a synonym of Phialocephala, and the species S. castaneae = P. fumosa. We are in agreement with this synonymy also because the above-proposed amendment makes possible the inclusion in Phialocephala of species either with or without metulae.

The Hyphomycete here described is surely includible in this enlarged concept of the genus Phialocephala, within which limits it presents affinities with P. fumosa. It differs from this species mainly in the shape of the collarettes and of the conidia, which are moreover produced in slimy masses and not in chains. In addition, this is the only species in the genus Phialocephala with a stipe distinctly lobed at the base.

For the above-mentioned reasons we propose P. mexicana as a new species.

Another species belonging to the genus Phialocephala has been discovered during some mycological researches carried out within the Tai Project: Effects of increasing human activities on South-Western Ivory Coast tropical forests, UNESCO, Program M. A. B., Project n. 1.

Phialocephala ivoriensis Zucconi et Onofri sp. nov.

Coloniae amphigenae, effusae, parum manifestae, non circumscriptae. Mycelium immersum. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel flexuosa, levia, usque ad 360 µm longa, ex stipite et penicilliformi apparatu conidiogeno composita. Stipes

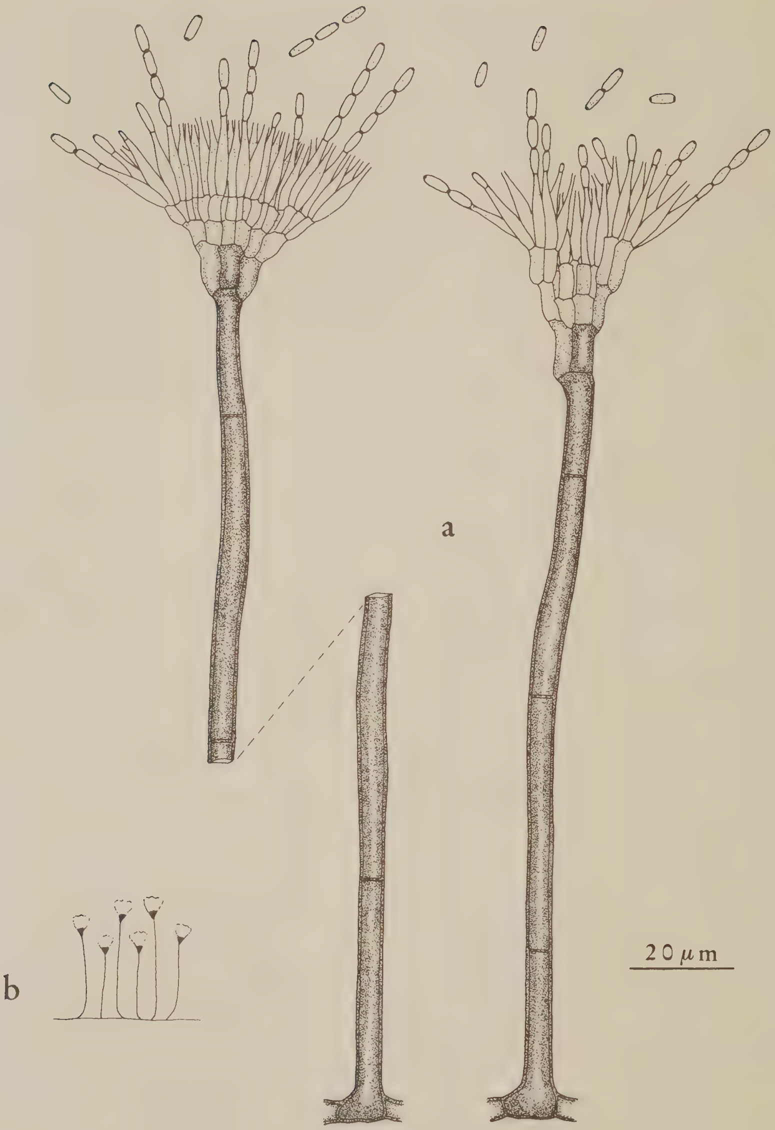

Fig. 3 - Phialocephala ivoriensis: a. conidiophores and conidia; b. habit sketch.

2-3-septatus, parietibus crassis, atro-brunneus, ad apicem versus leviter dilutior et attenuatus, basi inflatus et leviter expansus ad metularum nexum; 135-315x3,6-5,4 µm; 11-18 µm ad basim crassus. Apparatus conidiogenus ex apice stipitis ortus, obconicus, complexus, 35-45 µm longus, 3 ex seriebus metularum compositus, distaliter phialides ferens. Metulae primariae 2-4, parietibus crassis, pallide brunneae, metula media integrata et brunnea; 7,2-18x3,6-4,5 µm. Metulae secundariae 2-4 in singula metula primaria, parietibus tenuioribus quam primariae, pallide brunneae; 3-8x3-3,5 µm. Metulae tertiariae 2-4 in singula metula secundaria, parietibus tenuibus, pallide brunneae; 4,5-8x2,7-3,6 µm. Cellulae conidiogenae 2-4 in singula metula tertiaria, fere pari altitudinis fastigio positae, enteroblasticae, monophialidicae, discretae, determinatae, graciles, subulatae vel lagoeniformes, parietibus tenuibus, pallide brunneae, non definito collaretto praeditae; 12,5-15,5x2-3,5 µm. Conidia aseptata, levia, conidiogenis cellulis concoloria, subcylindrica, rotundata et crassa ad apices, in catenis pertinacibus extrusa et in capitulum mucosum ad conidiophori apicem congregata; 4,5-5,4x1,8-2,2 µm.

In foliis emortuis, Tai, Ora Eboris, 23.3.1981, holotypus: H. B. R. 126A; in foliis emortuis, Tai, Ora Eboris, 23.3.1981, paratypus: H. B. R. 126A(1)

Colonies amphigenous, effuse, scarcely visible, uncircumscribed. Mycelium immersed. Conidiophores macronematous, mononematous, solitary, erect, straight or flexuous, smooth, up to 360 µm long, consisting of a stipe and a conidiogenous apparatus arranged in a penicillate manner. Stipe 2- or 3-septate, thick-walled, dark brown, slightly paler and tapering toward the upper part, inflated at the base and slightly widened at the insertion of the metulae; 135-315x3.6-5.4 µm; 11-18 µm wide at the base. Conidiogenous apparatus terminal on the stipe, obconical, complex, 35-45 µm long, consisting of 3 series of metulae ultimately bearing a cluster of phialides. Primary metulae 2-4, thick-walled, pale brown, with the central one integrated and darker in colour, measuring 7.2-18x3.6-4.5 µm. Secondary metulae 2-4 on each primary metula, somewhat thinner-walled, pale yellowish brown; 3-8x3-3.5 µm. Tertiary metulae 2-4 on each secondary metula, thin-walled, pale yellowish brown; 4.5-8x2.7-3.6 µm. Conidiogenous cells 2-4 on each tertiary metula, all arising at approximately the same level, enteroblastic, monophialidic, discrete, determinate, slim, subulate or lageniform, thin-walled, pale yellowish brown, with undefined collarettes; 12.5-15.5x2-3.5 µm. Conidia aseptate, smooth, with the same colour as the conidiogenous cells, subcylindrical with rounded and thickened apices, produced in long persistent chains aggregated in slimy masses at the apex of the conidiophore; 4.5-5.4x 1.8-2.2 µm.

The Hyphomycete here described presents some affinities with the type species of the genus *Phialocephala*, *P. dimorphospora* Kendrick

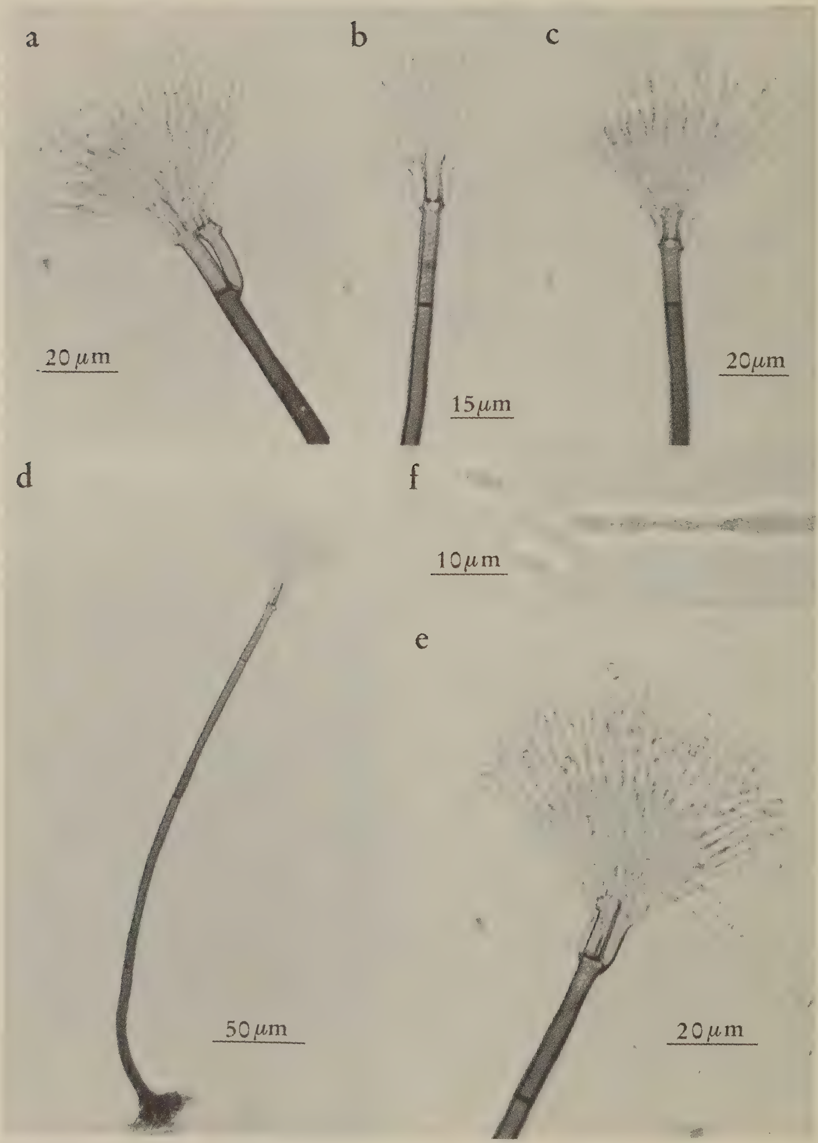
a
b
c
20 µm
15µm
20µm
d
f
10µm
e
50µm
20µm

Fig. 4 - Phialocephala ivoriensis: a., b., c. and e. conidiogenous heads; d. conidiophore; f. phialide and conidia.

(1961), mainly in the general morphology of the conidiophore, in its conidiogenesis and in the catenate conidia, but it differs from the above-mentioned species most importantly in the absence of long cylindrical collarettes, as well as in several other characteristics, such as the shape of the conidia. Our fungus presents phialides without well-defined collarettes such as are found in *P. phycomyces* (Auerswald) Kendrick (1964), *P. humicola* Jong et Davis (1972) and *P. gabalongii* Sivasithamparam (1975). It differs from the first-named in the dimensions of the conidiophores, which are smaller, in the conidiogenous apparatus, which is simpler, in the shape and the dimensions of the phialides and in the conidia, which are in chains and thickened at the apices; it differs from *P. humicola* in the shape and the dimensions of the phialides and of the conidia, which are, as stated above, in chains. Finally, it differs from the third species, in the number of the series of metulae, in the morphology of the conidiogenous cells, which are not thickened at the apex, and in the shape and dimensions of the conidia, which moreover in *P. gabalongii* are not in chains.

For the above-mentioned reasons we propose *P. ivoriensis* as a new species.

At this moment there are 14 species belonging to the genus *Phialocephala*. To facilitate the identification of these species we set out below a dichotomous key.

Phialides with typical well-defined collarettes, either flaring, swollen or cylindrical 1
Phialides without well-defined collarettes, or thickened at the apex . 10

1. Sterile lateral outgrowths present 2
1. Sterile lateral outgrowths absent 3

2. Conidia with lateral hilum .... *P. canadensis* Kendrick
2. Conidia with basal scar .... *P. fluminis* Shearer, Crane et Miller

3. Collarettes cylindrical 4
3. Collarettes not cylindrical 7

4. Conidia bacilliform, cylindrical or subcylindrical........... 5
4. Conidia of two types ovoid and spherical, not bacilliform ....
.... *P. dimorphospora* Kendrick

5. Conidiogenous apparatus with one or more series of metulae .. 6
5. Conidiogenous apparatus with one series of metulae or without
metulae .... *P. fumosa* (Ell. et Ev.) Sutton

6. Metulae well-defined lengthened branches *P. bactrospora* Kendrick
6. Metulae very short and irregular in shape .... *P. truncata* Sutton

7. Collarettes regular 8
7. Collarettes irregular .... *P. fusca* Kendrick

8. Conidiogenous apparatus terminal on the stipe 9
8. Conidiogenous apparatus lateral on the stipe ..... *P. illini* Crane

9. Conidia more or less spherical . P. repens (Cooke et Ellis) Kendrick
9. Conidia subacerose, often slightly curved or sigmoid .... P. mexicana Onofri et Zucconi

10. Conidia not in chains, either subglobose, ovoid or ellipsoidal 11
10. Conidia in chains, subcylindrical . P. ivoriensis Zucconi et Onofri

11. Phialides flask-shaped, with thickened apices .... P. gabalongii K. Sivasithamparam
11. Phialides not flask-shaped 12

12. Phialides very long, up to 40 μm, subulate .... P. phycomyces (Auerswald) Kendrick
12. Phialides relatively short, up to 12 μm, cylindrical .... P. humicola Jong et Davis

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STUDIES IN THE GENUS *PHOMA*. IV. CONCERNING *PHOMA MACROSTOMA*.

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ABSTRACT

Phoma macrostoma Montagne, is described and illustrated. Its cultural characteristics and the structure of its pycnidial wall are documented.

INTRODUCTION

The *raison d'être* behind our undertaking a reexamination of species concepts in the genus *Phoma* Saccardo lies primarily in a wish to resolve problems frequently encountered in applying names to isolates, particularly when known only from *in vitro* axenic culture. Uncertainties concerning specific taxonomy in the genus are caused not only by lack of fully adequate documentation of morphological and biological discontinuities but by absence in the literature of clear identification of the key characters separating individual entities. There is often difficulty in applying a classification based on morphological characteristics exhibited when a fungus occurs on natural substrates to an isolate grown in pure culture on agar media. Several criteria considered to be useful and reliable in a natural substrate-based taxonomy are sometimes found to be unstable and of little use in identifying isolates *in vitro*. A classification, in order to be practical, must, in large part, be based on criteria that are invariable or on characters which do not vary significantly within a species but which differ between species, whatever the growing condition. It is essential to recognize at least one or two characters for each specific taxon that are comparable in all conditions both in culture and on natural substrata. Failing this, two classifications will have to exist. One, based on traditional criteria, particularly host-substrate relationship, the other on predominating cultural characteristics. Our approach in these studies is multidimensional. A reevaluation is made of criteria used traditionally in recognition of species while searching for additional stable characteristics. Among the latter, structural aspects of the pycnidial conidiomata are

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thought to have potential value, even at specific level.

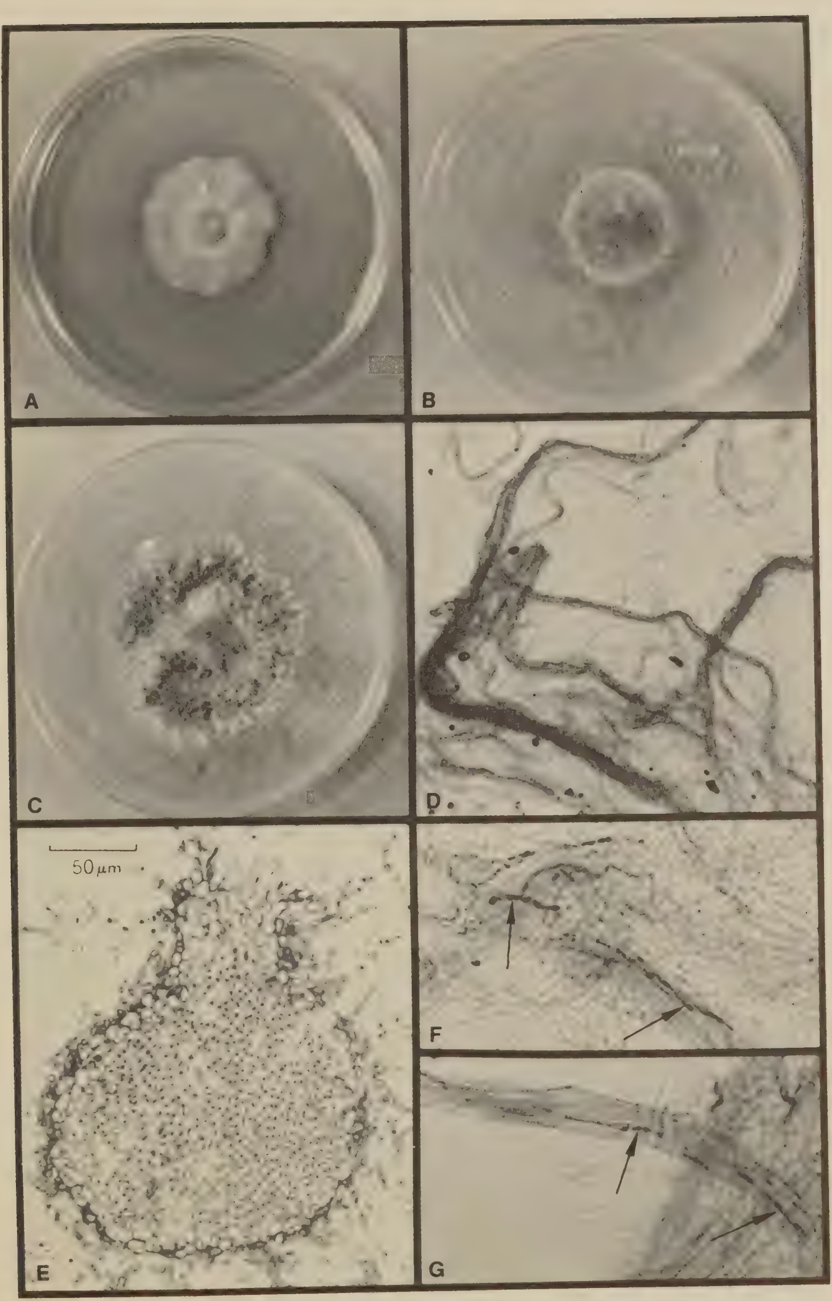
Pycnidial wall composition and structure have been little used in coelomycete taxonomy for characterizing species. Within some genera the structure of conidiomata may vary but little. In others, however, including *Phoma* as presently constituted, it is evident that some diversity occurs in this regard. White and Morgan-Jones (1983) showed that the presence of large, inflated cells in the pycnidial wall of *Phoma sorghina* (Sacc.) Boerema, Dorenbosch and van Kesteren is diagnostic for that species. In a reexamination of *Phoma* and *Ascochyta* species described by Wollenweber and Hochapfel as fruit-rotting fungi, Boerema and Dorenbosch (1973) recognized the usefulness of determining the structure of the pycnidial wall for identification purposes. No attempt was made, however, to document pycnidial wall anatomy. Pycnidial walls were broadly categorized as being either of pseudoparenchymatous cells, or, where hyphal elements are present, having a prosenchymatous structure. Some species, such as *Phoma pomorum* Thümen, were said to have flat, furrowed pycnidial walls; others, such as *Phoma betae* Frank, were described as having "hairy" walls with hyphal outgrowths. The pycnidia of *Phoma cava* Schulzer were noted to have a different wall structure but the precise nature of this variance was not detailed. In an ink-drawing illustration contrasting the pycnidial wall surface of *P. cava* and *P. pomorum* the cellular composition of the former is shown as being less discernible than in the latter. *P. cava* bears filiform, septate conidiophores and may not be properly classified in *Phoma*. A group of species, many of which were previously classified in the genus *Plenodomus* Preuss, were made the basis of a new section of the genus *Phoma* [sect. *Plenodomus* (Preuss) Boerema, van Kesteren and Loerakker] by Boerema et al (1981). These taxa are characterized by possession of more or less thick-walled, hyaline cells lining the venter of the pycnidia and sometimes extending irregularly, as protruding mounds of tissue, into the pycnidial cavity, especially at the base. Such cells were termed scleroplectenchyma.

During the course of our recent study of *Phoma* species we have had opportunity to examine two isolates of *Phoma macrostoma* Montagne. A detailed investigation of the characteristics of this plurivorous species *in vitro* and of its pycnidial wall anatomy has been conducted. The composition of the latter is quite unlike that of the other species described hitherto in this series of papers.

MATERIALS AND METHODS

Isolates were obtained from Plantenziektenkundige Dienst, Wageningen, The Netherlands and the American Type Culture

PLATE 1. *Phoma macrostoma*. A, 7-day old colony on PDA at 25C; B, 7-day old colony on MEA at 25C; C, 7-day old colony on MEA at 20C; D, funiculose mycelium; E, V.S. pycnidium; F,G, mycelium bearing reddish pigment (indicated by arrows).


A
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C
D
50 µm
E
F
G

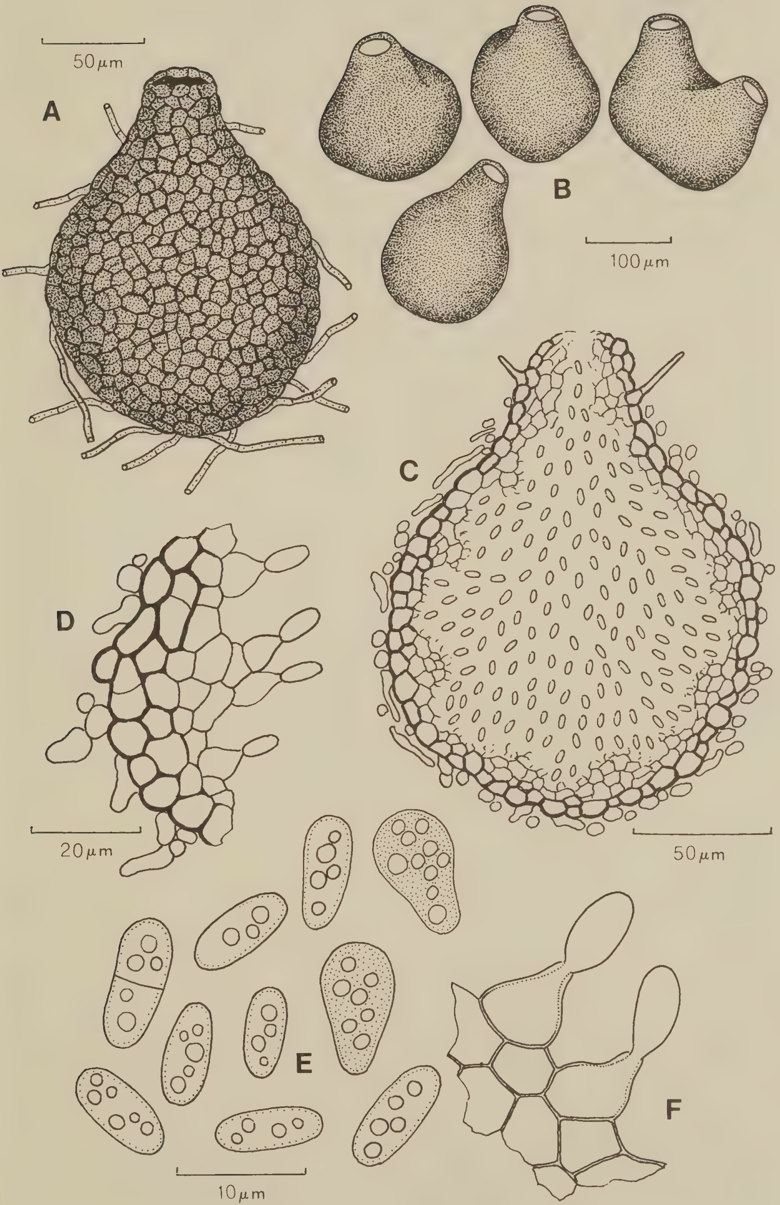
Collection. Axenically grown cultures were prepared from single conidia. Standardized conditions for growth were those used by Morgan-Jones and White (1983), as were the techniques for sectioning.

TAXONOMIC PART

Phoma macrostoma Montagne, Ann. Sci. nat., ser. 3, 11: 52, 1849 (Plates 1 and 2, figure 1).

Colonies on potato dextrose agar (Plate 1, A) felty to lanose, pale gray to light purplish, margin compact, regular, attaining a diameter of 35mm at 20C after 6 days, 33mm at 25C, with no growth at 30C; reverse dark brick-red to brownish centrally, becoming gradually lighter marginally. Colonies become purple-blue in color following the addition of NaOH. Colonies on malt extract agar (Plate 1, B & C) coarsely lanose, becoming strongly funiculose, somewhat variable in color from pale grayish-olivaceous to purplish, margin distinctly arachnoid, attaining a diameter of 55mm at 20C after 6 days, 33mm at 25C, with no growth at 30C; reverse dark brick-red to brownish centrally, becoming gradually lighter marginally. Pycnidia are produced abundantly on both PDA and MEA after ten days, superficial or partly immersed in the agar. No growth or pycnidial production occurred on cellulose agar. Mycelium composed of septate, infrequently branched, hyaline to subhyaline, smooth, 2 - 4µm wide hyphae. Aerial hyphae abundant, frequently ascending in closely appressed funiculose strands (Plate 1, D), especially on MEA. Hyphae often containing concentrated, deep red to violet pigment deposits at intervals (indicated by arrows in Plate 1, F & G), imparting a purplish hue to the colonies especially when present in abundance. Pycnidia solitary, flask-shaped (Figure 1, B), brown to blackish-brown, pseudoparenchymatous, uniostiolate or, occasionally, biostiolate, 150 - 250µm in diameter, usually bearing a short but distinct neck, 50 - 70µm wide; ostioles large, 20 - 40µm in diameter. Pycnidia usually partly or completely covered by mycelium in colonies on PDA and MEA, loosely hairy. Hyphal outgrowths from the outer wall cells in the neck region are sometimes present (Plate 1, E). Pycnidial wall composed of more or less isodiametric cells (Plate 2, B-D), up to five cells deep, 20 - 30µm thick. Outer wall cells thick-walled, pale brown to brown, 5 - 10µm in diameter, occasionally somewhat elongate. Inner wall cells thinner-walled, lining the venter, very pale brown to subhyaline, irregular in number, constituting an uneven layer, in part clustered, forming pulvinate protrusions at irregular intervals extending into the pycnidial cavity. Conidiogenous cells (indicated by arrows in Plate 2, B) phialidic, hyaline, simple, smooth-walled, mostly ampulliform, borne on the innermost cells of the pycnidial wall up to the base of the

FIGURE 1. A, pycnidium; B, variation in pycnidial shape and number of ostioles; C, V.S. pycnidium; D, portion of pycnidial wall; E, conidia; F, conidiogenous cells.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A
B
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D
20 μm
50 μm
E
10 μm
F

neck region, 4 - 7µm in diameter. Conidia hyaline, simple, multiguttulate, somewhat variable in shape, cylindrical, oblong to ellipsoidal or, occasionally, pyriform, obtuse at each end, smooth, continuous or rarely one-septate, 5.5 - 9 X 2 - 3.5µm; with age, conidia often become swollen to several times their original size, frequently assuming a broadly pyriform shape (Plate 2, F) and turning pale brown in color.

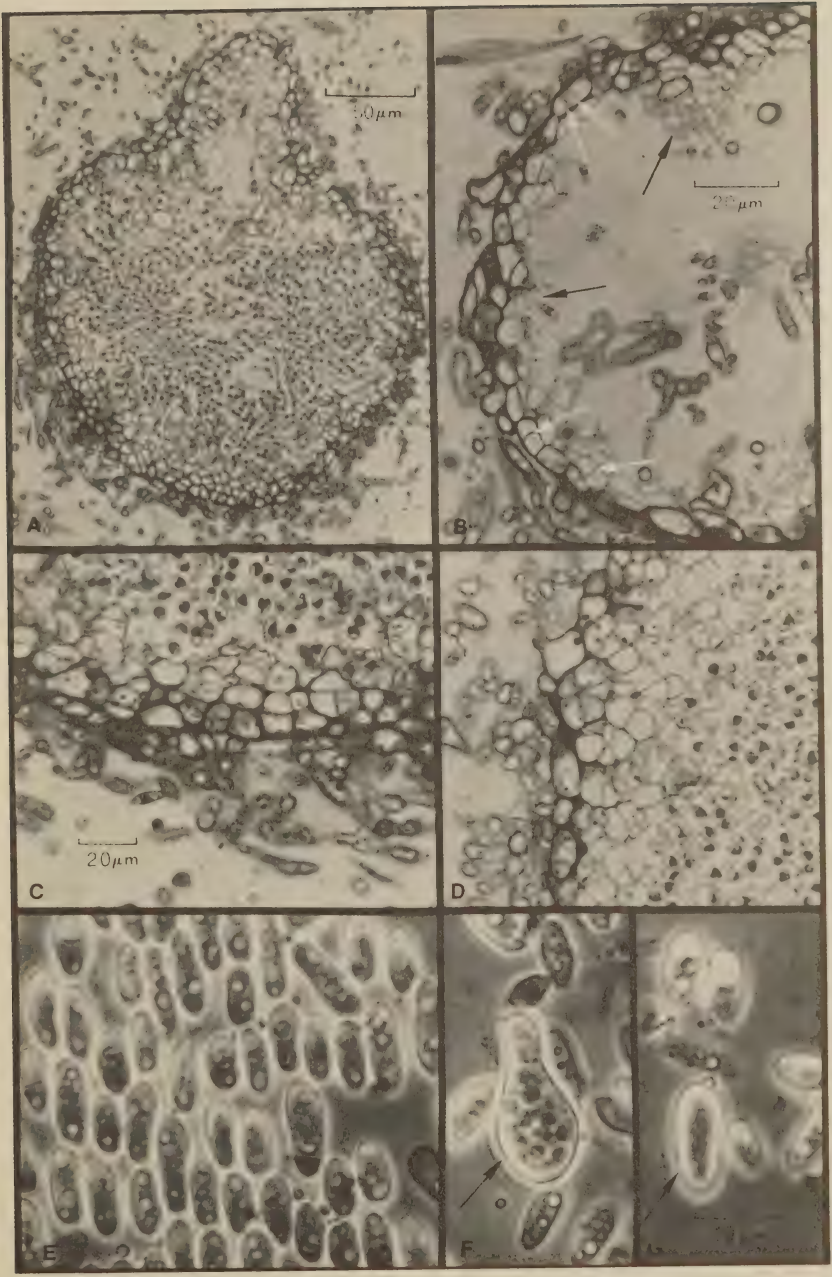
Ubiquitous on woody plants, incidental on herbaceous substrates, often associated with spots on leaves and fruits of apple; cosmopolitan.

Collections examined: isolate from buds of *Malus pumila* Mill., The Netherlands, G.H. Boerema and M. Dorenbosch, PD75/145, ATCC 28981, AUA; isolate from an apple fruit spot, Emmeloord, The Netherlands, G.H. Boerema, PD68/1014, AUA.

Phoma macrostoma is considered to be a plurivorous, weak pathogen, especially on woody members of the Rosaceae (Boerema, 1976). It occurs world-wide on a large number of hosts (Sutton, 1980). An account of its nomenclatural history and synonymy was given by Boerema and Dorenbosch (1970), who also chose a lectotype for the name. Its original spelling, *Phoma macrostomum*, is considered an orthographic error.

A number of characteristics serve to distinguish this species. The wide ostiole, of which the specific epithet is descriptive, is a notable feature, as are the peculiarities of pycnidial wall construction. The pulvinate, convex cellular extensions into the pycnidial venter are particularly distinctive. These occur over the whole inner wall surface, even into the neck region, and bear clusters of conidiogenous cells (Plate 2, B - conidiogenous cells indicated by black arrows). Subdivision of primary wall cells into smaller entities is apparent during maturation of both outer and inner wall layers. One or more thin transverse septa (indicated by white arrows in Plate 2, B) are laid down within the thicker-walled primary cells. This secondary cell division, occurring irregularly, is in part responsible for the uneven thickness of the pycnidial wall. It also leads to a progressive increase in the overall size of the pycnidium. Among the many species of *Phoma* examined by us to date this type of pycnidial wall anatomy has been encountered in but one other taxon, namely *Phoma medicaginis* Malbr. and Roum., var. *pinodella* (L.K. Jones) Boerema [White and Morgan-Jones, unpublished data]. The overall appearance of the pycnidial wall of *Phoma macrostoma* is not unlike that of some species classified by Boerema et al. (1981) in *Phoma* sect. *Plenodomus* in that the cavity of

PLATE 2. *Phoma macrostoma*. A, V.S. pycnidium; B-D, portions of pycnidial wall (conidiogenous cells indicated by black arrows, secondary pycnidial wall cell septation indicated by white arrows; E-G, conidia (swollen, pale brown conidia indicated by arrows).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mature pycnidia of the latter may also sometimes become irregular due to the occurrence of protrusions of thin-walled cells. These cells are, however, invariably subtended by more or less thick-walled, hyaline cells composing the tissue type referred to as scleroplectenchyma (Boerema and van Kesteren, 1981). For this reason *P. macrostoma* cannot be considered as a prospective member of section *Plenodomus* although its wall anatomy bears more similarity to that of species included there than it does to that of *P. herbarum* Westd., the type species of the genus *Phoma*. Clearly, satisfactory circumscription of taxonomic infrageneric sections within *Phoma* must await accumulation of more knowledge than is at present available.

Additional features useful in identifying *P. macrostoma* include colony morphology on MEA, particularly hyphal roping to give a funiculose appearance, a higher growth rate at 20C than at 25C, and the presence of aggregations of red pigment at intervals in the hyphae. The heavily guttulate conidia, some of which swell and become brownish with age, are also distinctive. Conidial septation is variable *in vitro*. Conidia are predominantly unicellular but sometimes a single septum, or rarely up to three, are formed.

Strains of *P. macrostoma* not possessing red pigment in their hyphae have been made the basis of the varietal name *incolorata* (Horne) Dorenbosch and Boerema.

ACKNOWLEDGMENTS

We are grateful to Dr. Gerhard H. Boerema, Wageningen, The Netherlands, for providing us with an isolate of *P. macrostoma*. Dr. Carol A. Shearer, University of Illinois reviewed the manuscript.

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MYCOTAXON

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PANELLUS LONGINQUUS SUBSP. PACIFICUS A NEW WEST COAST NORTH AMERICAN AGARIC ASSOCIATED WITH RED ALDER

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ABSTRACT

Panellus longinquus subsp. *pacificus* subsp. nov. occurs in British Columbia, Washington, and Oregon mainly on rotting logs and branches of *Alnus rubra* Bong. *Panellus longinquus* (Berk.) Singer subsp. *longinquus* occurs in the equivalent temperate zone in South America.

The agaric flora of the Pacific coast of North America still harbours many undescribed taxa. Several new pleurotoid agarics have been discovered and will be described elsewhere by S.D. Libonati-Barnes. *Panellus longinquus* subsp. *pacificus* was independently recognized as an undescribed taxon by both researchers during the course of separate investigations. The fungus appears to be restricted to coastal areas where it usually occurs on rotting wood of red alder (*Alnus rubra* Bong.), a coastal hardwood in both the U.S.A. and Canada.

Panellus longinquus subsp. *pacificus* Libonati-Barnes & Redhead subsp. nov. Figs. 1-10

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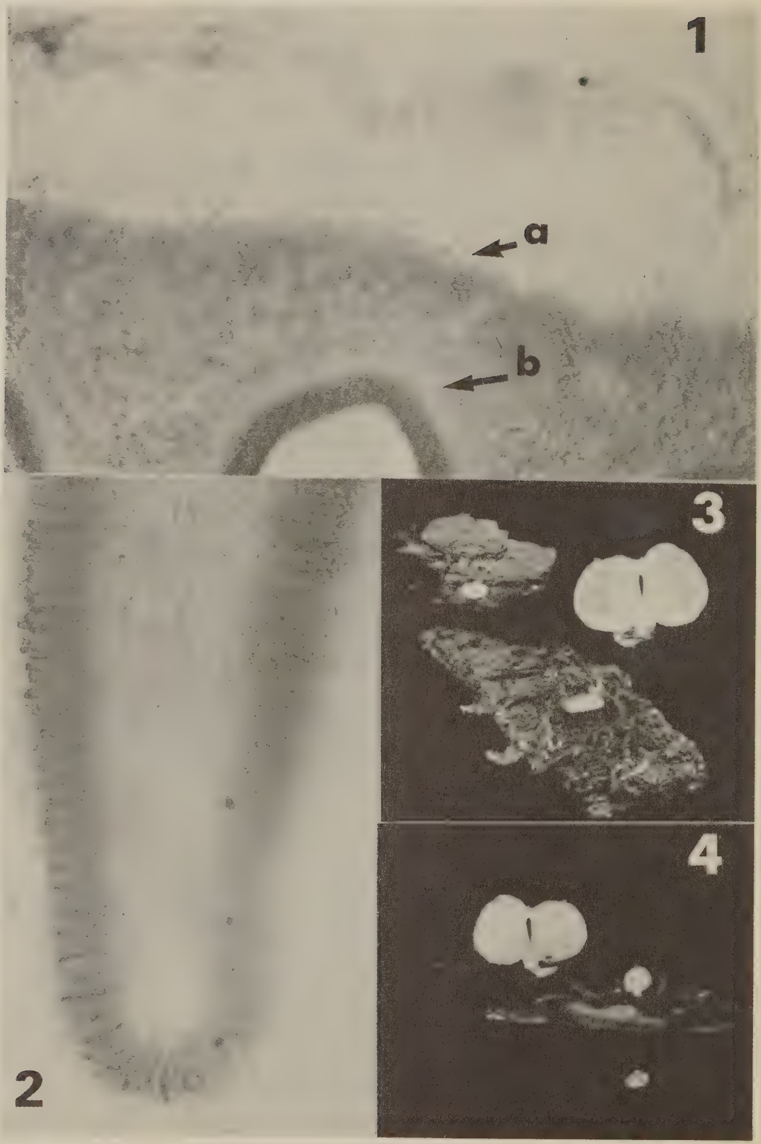
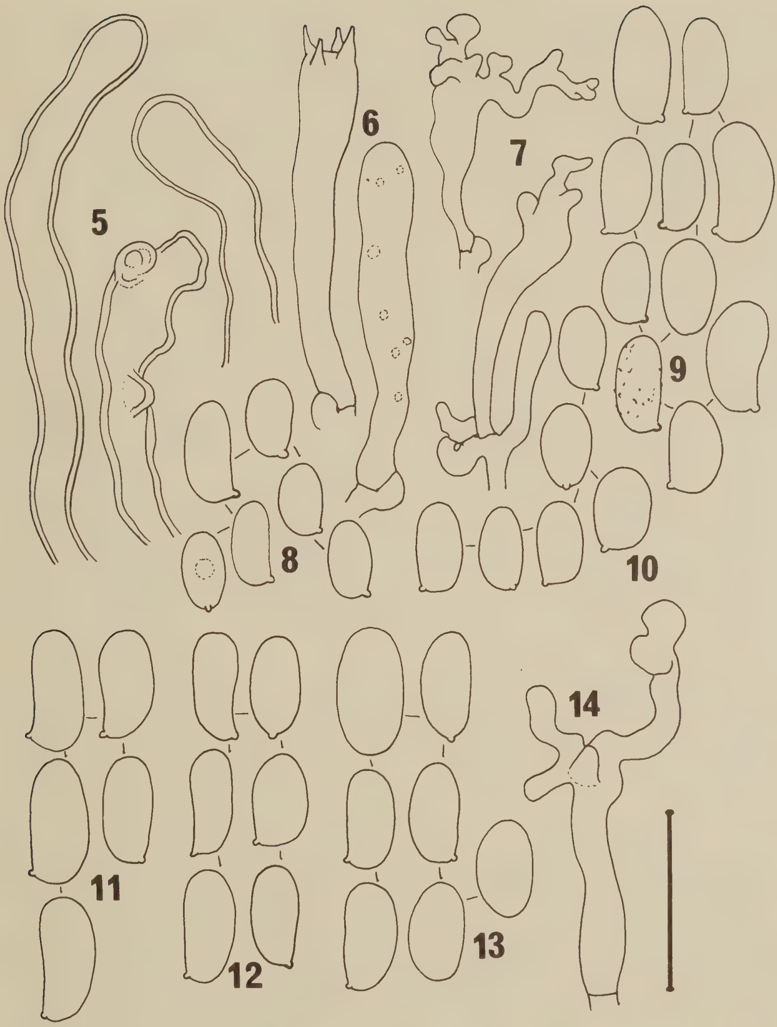


Figs. 1-4. *Panellus longinquus* subsp. *pacificus*. 1. Cross section of pileus showing the thick gelatinized subpellis, a compact upper trama(a), the less dense lower trama, the gelatinized subhymenium(b), and the hymenium. 2. Fertile lamellar edge in cross section. 3,4. Two views of small basidiomes, life size (DAOM 185837). Figs. 1-2. (DAOM 180405).



Figs. 5-10. *Panellus longinquus* subsp. *pacificus*. 5. Caulocystidia. 6. Basidia. 7. Cheilocystidia. 8,9, 10. Basidiospores. Figs. 5-8 (DAOM 185837). 9. One showing adhering debris common in this collection (DAOM 185838). 10. (DAOM 180405). Figs. 11-14. *Panellus longinquus* subsp. *longinquus*. 11. Basidiospores (BAFC 29151). 12. Basidiospores (BAFC 29144). 13. Basidiospores (BAFC 29145). 14. Caulocystidium (BAFC 29144). Bar = 15μm.

Pileus 2-40 mm *lat.*, 1-20 mm *long.*, *dimidiatus, glabratus, viscidus, hyalinus vel vinaceous, striatus ex parte. Lamellae decursivae, niveae vel pallide vinaceae. Stipes* 1-9 x 1-5 mm, *lateralis, niveus, pulveratus. Basidiosporae* 6-11.5(-13.5) x 3-5(-6)μm, *ellipsoideae vel cylindraceae, hyalinae, leves, amyloideae. Basidia tetraspora, clavata. Cheilocystidia coralliformia, infrequentia. Hyphae inamyloideae, fibulis. Pileus pellicula gelantinosa absitus. Subhymenia gelatinosa.*

Holotypus de ligno Alno rubro; S.D.L.-B.1529 (WTU).

PILEUS 2-40 mm wide x 1-20 mm long, when very young orbicular, at maturity flabelliform, reniform, or irregularly lobed, in profile convex, often depressed at the rear; margin inrolled; surface glabrous, hygrophanous, translucent when wet and often viscid, opaque and concentrically rugose when dry; colors when young pale ivory, faint peach (5A2 orange white, Kornerup & Wanscher 1966), or tan (5B3 pale orange), with age becoming pinkish (7C4 brownish orange) on a camel brown background (6D4), "pale greyish vinaceous, rosy vinaceous or rosy buff" (Rayner 1970) and finally, in some specimens, brown (6F7 chestnut brown) with purple-brown discoloration (9F3 grayish brown), when dried becoming translucent waxy yellow (4A2 yellowish white), or opaque golden brown, or purple-brown, varying with age and exposure; CONTEXT 0.6-1.0 mm thick, firm, fibrous, white to pale pinkish tan, odor and taste not distinctive.

LAMELLAE short decurrent onto a stipe or pseudostipe, 1-3 mm wide, close when young, subdistant with age (16-36 per cm at the margin, 14-35 per cm at the stipe), entire, firm, ivory, pale yellow-cream, or peach like the young pileus, sometimes drying with a greyish tint; transverse rugae sometimes present.

STIPE absent or present, when present lateral, varying from a mere prolongation of the pileus to a distinct stipe, horizontal to ascending, always fairly broad at the lamellar attachment, 1-9 mm long x 1-5 mm wide; context white, firm, initially solid, with age hollow; surface ivory, yellow-cream, peach, or brown, varying with age, often frosted on the inferior surface, usually with some white coarse tomentum toward the base, and a small mat of hyphae extending on to the substratum.

HYMENIAL FEATURES: SPORES in thick deposits dingy yellow-cream (3A3 pale yellow), 6-11.5 (-13.5) x 3-5.0 (-6)μm, L/D 1.75-3.25, average L/D 2.3, subcylindric, short-boletoid, or ellipsoid, occasionally slightly dumbbell-shaped, subreniform, or suballantoid, usually slightly curved at the apicular end, in face view elliptical to short-cylindric, usually centrally constricted, smooth, hyaline, amyloid; BASIDIA 4-spored, narrowly clavate, 30-41.5 x 4-6.2µm, often multiguttulate; sterigmata 2µm long; PLEUROCYSTIDIA none; CHEILOCYSTIDIA absent in young lamellae, sparsely scattered and inconspicuous, or sometimes erumpent in small fascicles, clavate, irregular, filiform or capitate, ultimately branched and coralliform, 22-50 x 2-6µm, with necks 1.3µm, the bases sometimes slightly gelatinized; lamellar edge occasionally with irregular deposits of brown amorphus material up to 25µm diam.; LAMELLAR TRAMA subparallel in the center of the lamella, gradually more interwoven toward the prominent subgelatinized subhymenium, of thick and thin-walled hyphae 2.5-6 (-19)µm diam., with the thicker-walled hyphae toward the lamellar base; subhymenium 10-25 (-50)µm thick, of densely interwoven hyphae 1.3-2.5 (-3)µm diam.

PILEAL STRUCTURE: PILEAL SURFACE a thin ephemeral cutis 5-10 (-125)µm thick which is usually worn away at maturity exposing the subtending gelatinized layer; hyphae contorted, radial, 2.5-3.5µm diam.; pileal projections scattered single or fasciculate hyphae 27-40 x 2-2.5µm; the subpellis gelatinized, typically 125-500µm thick, of hyphae 1-4µm wide, interwoven, ascendent or subradial; PILEAL CONTEXT composed of two layers: a compact radial layer 37-125µm deep, of hyphae 2.5-7.5 (-15)µm diam. with faint vinaceous brown tints; an interwoven layer 250-700µm deep, of thick-walled filamentous hyphae 3.5-30(-25)µm diam. with an occasional swelling; hyphal walls up to 1µm diam.

STIPE STRUCTURE: hyphae of the cortex 2-10µm diam., compactly arranged, parallel, with thickened walls, enclosing a medulla composed of hyphae similar to those of the pilear trama and continuous with that tissue. CAULOCYSTIDIA: present on the hymenial side of some well developed stipes, scattered to clustered, 20-50 x 5-8µm, nodose-clavate or more irregular, with thickened hyaline walls. BASAL MYCELIUM: radiating in short strigose bundles, the hyphae thin-walled, smooth 2-3µm diam. CLAMPS: present on all hyphae. CULTURAL CHARACTERISTICS (25°C): Colonies (DAOM 180405) at 1 wk, produce a very strong reaction (brown opaque corona) with little growth on tannic acid agar; a moderately strong reaction (translucent brown corona) and little growth on gallic acid agar; on 2% malt agar moderately fast growing, 15 mm rad. at 1 wk., 40-50 mm at 3 wks., white and loosely woolly at first, later becoming felty centrally; hyphae of the leading edge 1.5-3.5µm diam., slightly sinuose, thin-walled, with long cells (>100µm), with elongated clamps sometimes giving rise to branches, otherwise irregularly branched; aerial hyphae similar but tending to fall into two ranges, 1-1.5µm diam. and 3.5-4µm diam.; hyphae in the center at 3 wks. more contorted, many containing numerous refractive granules, and usually constricted at the septa, some broader hyphae empty and with cytoplasmic rich narrower hyphae more abundant proportionately. No spores or cystidia noted.

HABITAT, HABIT AND SUBSTRATE: solitary to gregarious or subcespitose-imbricate on decorticated or partially decorticated fallen logs and branches of *Alnus rubra* Bong. or rarely on conifers including stumps of *Tsuga heterophylla* (Raf.) Sarg., in mixed temperate coastal rain forests.

COLLECTIONS EXAMINED: Canada: British Columbia: Queen Charlotte Islands, Graham I., Naikoon Prov. Park, Tow Hill, Sept. 20, 1982, S.A. Redhead 4128 (DAOM 185837); North Vancouver, Seymour R., Jan. 3, 1983, T. Taylor (DAOM 185838); Vancouver I., Cowichan L., at Millar Cr., Sept. 26, 1979, S.A.R. 3166 (DAOM 180405), Jordan R., Dec. 2, 1982, D. Chu VC-83-1 (DAOM 188294). U.S.A. (all at WTU): Oregon: Lincoln Co., Cascade Head, Nov. 3, 1979, S.D. Libonati-Barnes 1584; Tillamook Co., Sandlake, Nov. 13, 1976, S.D.L.-B. 1252, F. Van De Bogart (S.D.L.-B 1253,1256). Washington: Clallam Co., Cape Flattery, Jan. 12, 1976, A.R. Palmer (S.D.L.-B. 593,596); Gray's Harbor Co., 3 mi S of Copalis, Sept. 12, 1979, S.D.L.-B. 1529 (holotype), Ocean Shores, Dec. 11, 1977, J. Roger (S.D.L.-B. 1558,1559), Dec. 16, 1979, F.V.D.B. (S.D.L.-B. 1573, 1574); Jefferson Co., W coast of Olympic Pen., near Ruby Beach, Nov. 17, 1974, J. Hunter (S.D.L.-B. 377).

Panellus longinquus subsp. *longinquus* and subsp. *pacificus* were at first believed to represent distinct species by both authors. Although both taxa were known to have rosy pigments, gelatinized tissues in their pilei, and gross morphological similarities, there appeared to be other distinct morphological differences reported by various authors. Singer (1951 p. 471) studied the type of *Agaricus longinquus* Berk. in Hooker, the basionym of *Panellus longinquus*, and reported the amyloid collapsed spores to be about 8.2 x 2.7μm. *Agaricus minusculus* Speg. was said to be conspecific. Singer (1952 p. 209-210) and Singer & Digilio (1952 p. 121-122) published more detailed descriptions based on both types but no fresh materials. The spores were recorded as 6.8-8 x 2.7μm. Cystidioles were said to have replaced most basidia. Later, Singer (1954 p. 117-118) published on his own collections. In this much expanded description the spores were reported to be 6.8-9.7 x 2.7-4.5μm. Reference to the cystidioles was dropped as was the mention of versiform cheilocystidia described in both 1952 publications. Singer (1969 p. 87-88) listed additional collections, noted that Horak (1967) had erroneously reported the spores of the type of *Agaricus minusculus* to be inamyloid, and suggested that *Agaricus tasmanicus* Berk. might be synonymous. Singer (1975) has also suggested that *Panellus roseolus* Stevenson (1964) is a synonym. Raithelhuber (1977) gave 6.8-8 x 2.5-3μm as the spore size but did not indicate what material had been examined. All these reports are based on materials from the southern hemisphere.

Examination of Singer's collections deposited at BAFC by S. Redhead convinced us that the North American and South American collections represented very closely related taxa. The spore sizes overlap (figs. 11-13), the gross morphological variation is the same, many collections were similarly palely pigmented, the presence of a prominently gelatinized subpellis and less conspicuous subhymenium was confirmed in both, and the hymenial appearance was identical. The nonsporulating elements were considered to be basidioles. Cheilocystidia were not observed on Singer's collections but they had been reported by him on the type materials he had examined earlier (Singer 1951,1952) and the reported general shape resembled that found in our collections. Caulocystidia present on Singer's material (fig. 14) resembled those in our collections but tended to be thin-walled.

The main differences between the two taxa are subtle. Subsp. *longinquus* has never been reported to be darker than rosy colour centrally (Singer 1954), its gelatinized subpellis tends to be thinner (approx. 60-70µm deep), and the caulocystidia have not been observed to be thickened. These differences are mainly quantitative and therefore they are considered to be less important than would be distinct morphological differences. As these differences are correlated with a large geographic separation the North American collections are recognized at the subspecific level. *Panellus longinquus* has not been reported from the northern hemisphere previously (Moser 1983, Miller 1970).

In western North America small pale basidiomes of *Panellus longinquus* subsp. *pacificus* can be confused with *Panellus mitis* (Pers.:Fr.) Singer. Miller (1970) reported *P. mitis* basidiomes up to 8 mm wide but illustrated, life size, basidiomes of an A.H. Smith collection up to 2 cm wide. Smith's collections at Ann Arbor cited by Miller were checked and confirmed to be *P. mitis*. Some basidiomes reached 2 cm in width; thus they overlap *P. longinquus* subsp. *pacificus* in size. *Panellus mitis* differs by its typically coniferous substrates, narrower spores (3.5-6.0 x 0.9-1.2µm, Miller 1970) than *P. longinquus* subsp. *pacificus*, and prominently gelatinized lamellar edges (see Miller 1970, fig. 31).

Specimens of *Panellus longinquus* subsp. *longinquus* examined: ARGENTINA: prov. Neuquén: Lago Nahuel Huapí, April 1964, R. Singer (BAFC 29145); Los Cántaros, Nov. 10, 1966, R. Singer M6050 (BAFC 29146), M6049 (BAFC 29144); Parque Nacional Nahuel Huapí, Santa Maria, April 19, 1965, R. Singer M5072 (BAFC 29148); Quetrihué, May 18, 1952, R. Singer M734 (BAFC 29151). prov. Rio Negro: Camino a los Cantaros, Puerto Blest, Mar. 23, 1963, R. Singer M3140

(BAFC 29149). CHILE: prov. Valdvia: Cordillera Pelada, May 6, 1965, R. Singer M5531 (BAFC 29147), May 9, 1965, R. Singer M5640, 5646 (BAFC 29150, 29152).

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We thank Prof. Jorge Wright (BAFC) for the loan of *P. longinquus* and Dr. Robert Fogel (MICH) for the loan of *P. mitis*. The help of Drs. J. Ammirati and the late D. Stuntz (WTU) to S.D.L.-B. was greatly appreciated. Collecting support (to S.A.R.) was provided by the B.C. prov. Min. Forests (Lake Cowichan), Min. Parks & Recr. (Naikoon Park), Can. Dept. Environ. (Pacific For. Res. Centre), and Can. Forces Base (Masset). Helpful reviews were provided by Drs. T. Baroni and J. Ginns.

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NOTICE

IX EUROPEAN MYCOLOGICAL CONGRESS 1985

The First Circular describing the IX European Mycological Congress, to be held in Norway, 15-21 August, 1985, was mailed in December, 1983. Lectures will be combined with all-day congress sessions and laboratory work.

A pre-Congress foray on Agaricales will be held 11-15 August at a field station in the alpine area at Finse; four post-Congress forays will be held, one on Ascomycetes at a hotel in Kongsvoll/Grimsdalen in the upper boreal area, one on Agaricales at a field station in the lower boreal area at Hurdal, another on Agaricales at a hotel in Biri in the lower boreal area, and a fourth at a field station at Stange, in the lower boreal area, on Aphyllophorales. All post-Congress forays run from 21-25 August.

The Committee had requested that all who planned to attend contact them before 1 April 1984, before this notice will appear in print. Perhaps some late registrations will be accepted? Contact:

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NOTICE

4th INTERNATIONAL MARINE MYCOLOGY SYMPOSIUM

The First Circular describing the 4th International Marine Mycology Symposium to be held in Portsmouth, England, 11-17 August, 1985, requests contact by 1 March, 1984, as a deadline date for titles of offered papers. A Second Circular will be distributed in November, 1984, with abstracts to be submitted by 1 March, 1985.

There will be two workshops, one each on Higher Marine Fungi and on Lower Marine Fungi, a Poster session, and five sections, as follows (Convenor noted):

1. Taxonomy (E. B. G. Jones)
2. Physiology and Biochemistry (D. H. Jennings)
3. Ecology (G. J. F. Pugh)
4. Lower fungi (S. T. Moss)
5. Applied topics and biotechnology (R. A. Eaton and E. B. G. Jones)

The Erika Kohlmeyer Prize will be awarded for the best paper submitted by a graduate (or postgraduate) student, which must be the sole work of the student.

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REVUE DES LIVRES

par

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ICONES MYCOLOGICAE 1-18, by J. RAMMELOO édit., 17 p., 6 pl.b.w., 12 pl. col., in 4°, in folder, 1982. Jardin Botanique National de Belgique, Domaine de Boechout, B-1860 Meise, Belgium. Price FB 600.- (Benelux), 700.- (Europe), 800.- (outside Europe).

The National Botanic Garden of Belgium recently started the publication of a new series entitled *Icones Mycologicae* composed of coloured loose-leaved plates of fungi and text sheets. The first issue contains the first 18 plates, devoted to *Russula* species of temperate regions of Europe and North America (4 species from Belgium, 3 from the Netherlands, 1 from France, 1 from Germany, 1 from the Grand Duchy of Luxemburg, 3 from Pennsylvania, USA). This set comprehends 12 water colour plates (25 x 32 cm) painted by the Belgian mycologist Louis IMLER, from Antwerp, and 6 plates of scanning electron microscopical photographs of spores. The description of the 13 species and some complementary line drawings are printed on separate sheets. The carpophores are painted at natural size, microscopical features are magnified 1000 x to 4000 x. Like in the other series published by the National Botanic Garden of Belgium, the *Flore Iconographique des Champignons du Congo* (en 18 volumes, 1935-1972) (still available at FB 5500.-), the colours of the original paintings carefully reproduced. The series is not only open to accurate descriptions and illustrations of macrofungi but offers the artistic mycological works to be preserved for ever. It will be issued at irregular intervals depending on the availability of critical studies accompagnied by good illustrations. Publication in English is prefered. From the quality of the first issue, we can predict a successful publication of the series.

SUPPRESSIVE SOILS AND PLANT DISEASE, par R. W. SCHNEIDER, 88 p., 14 x 22 cm., 1981. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA.Prix US $ 9.-(8.-).

Ce livre fait la synthèse des connaissances sur la propriété du sol d'inhiber (ou non) l'action des organismes phytopathogènes, base d'une forme de lutte biologique contre les maladies des plantes. Les sols possédant cette propriété, dits "sols suppresseurs" peuvent l'exercer à l'égard des champignons tels que *Phytophthora* spp., *Pythium* spp., *Fusarium* spp., *Gauemannomyces graminis* et *Rhizoctonia solani* comme à l'égard des bactéries ou des nématodes. L'induction de cette propriété antipathogène à des sols qui ne la possèdent pas a été réalisée par diverses voies, telles que l'addition de sol suppresseur, l'inoculation d'organismes inhibiteur parasites (*Trichoderma hamatum, T. harzianum*) ou l'addition d'amendements modifiant les caractéristiques du sol. Les résultats obtenus sont analysés mais ne sont pas encore entièrement expliqués. La méthode

ne connaîtra un succès assuré que grâce à une connaissance approfondie du système naturel sol-racine et sa lisation. Ce petit livre qui pourrait passer inaperçu est important. Il stimule la curiosité, incite à l'expérimentation et documente le lecteur de ses 240 références bibliographiques.

COMPENDIUM OF TURFGRASS DISEASES, par Richard W. SMILEY, 136 p., 66 fig., 185 ph. col., in 4°, broché, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121. Prix US $ 12.- (membre), 15.- (non membre).

Ce Compendium est le 9e volume de la série publiée par l'A.P.S. et concerne non seulement les spécialistes de la protection des plantes mais aussi tous les horticulteurs et les propriétaires de gazons. Comme à l'habitude, ce compendium traite successivement des maladies non infectieuses et des maladies infectieuses par champignons, bactéries, virus et nématodes, décrivant pour chacune d'elles les symptômes, les causes, l'écologie, l'épidémiologie et la technique de lutte. En plus des 48 maladies décrites, ce compendium montre l'existence de conjonctions et de successions de pathogénies. Il donne encore des clés symptomatologiques pour aider l'identification et les principes généraux d'une stratégie de lutte. Comme dans les autres compendia, le texte est ici remarquable par sa clarté et sa simplicité (les mots techniques étant repris en lexique), et son illustration graphique et photographique excellente. Traiter en un fascicule de toutes les maladies du gazon n'était pas une tâche facile, compte tenu encore de la diversité des graminées concernées, mais l'auteur, avec la collaboration de 25 spécialistes, l'a parfaitement réussie. C'est un ouvrage que beaucoup auront avantage à consulter.

COMPENDIUM OF ROSES DISEASES, par R. Kenneth HORST, A.P.S. Compendium (10), 72 p., 18 fig., 83 ph. col., in 4°, broché, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA. Prix US $ 12.- (membre), 15.- (non membre).

Ce Compendium est le premier de la série à traiter des maladies d'une plante ornementale, en l'occurence des roses dont les nombreux hybrides dérivent de quelques 7 espèces botaniques de *Rosa*. Des maladies étudiées, les plus importantes sont d'origine fongique, le blanc, l'oïdium la rouille, les tâches noires, l'anthracnose, le Botrytis, et divers chancres. Les maladies bactériennes atteingnent surtout les racines. Les maladies virales sont au nombre de 9. Les maladies physiologiques sont dues à des désordres nutritionnels, à la pollution de l'air, aux pesticides, et sont de beaucoup plus nombreuses et bien illustrées. Les roses étant les plantes ornementales les plus populaires à travers le monde, ce guide sur les maladies des roses et leur traitement sera utile à beaucoup.

METHODS AND PRINCIPLES OF MYCORRHIZAL RESEARCH, par N.C. SCHENCK édit., 244 p., 66 fig., 64 ph. col., in 4°, relié toilé, 1982. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA. Prix US $ 22.- (membre), 24.- (non membre).

Préparé par l' *A.P.S. Committee on Mycorrhizae*, ce livre répond au besoin d'une synthèse des nombreuses techniques en usage dans l'étude et l'utilisation des champignons mycorhizogènes, sur la base d'une explicitation des grand principes directeurs de ce domaine de recherche. Le livre est donc un véritable manuel de recherche sur les mycorhizes, donnant le pourquoi et le comment de chaque démarche. Il sera donc d'une grande utilité dans l'enseignement (il est le premier manuel didactique dans ce domaine) comme dans les laboratoires et les entreprises forestières. La première partie (90 p.) concerne les endomycorhizes, le plus souvent vesiculo-arbusculaires, et pour la plupart produites par les Endogonales (Zygomycotina). La deuxième partie (98 p.) traite des ecto- et ectendomycorhizes produites par des Basidiomycotina et Ascomycotina. Chacune des deux parties comprend un chapitre taxonomique précisant la manière d'observer les divers caractères diagnostiques, puis d'autres chapitres sur la description qualitative et l'évaluation quantitative de la mycorhization, les techniques nécessaires à la mise en culture in vitro, à la synthèse mycorhizique axénique et à l'étude de la réponse de l'hôte à la mycorhization. Dans une troisième partie, l'utilisation de radiotraceurs dans les approches physiologiques de la symbiose, l'observation au microscope électronique et l'étude de la relation entre la microflore du sol et la mycorhize sont d'application générale. Chacun des 18 chapitres de ce livre conduit en outre à une abondante littérature. 39 spécialistes de réputation mondiale ont contribué à cet ouvrage.

ECOLOGY AND COENOLOGY OF MACROFUNGI IN GRASSLANDS AND MOIST HEATHLANDS IN DRENTHE, THE NETHERLANDS, PART 2. AUTECOLOGY, PART 3. TAXONOMY, par Eef ARNOLDS, in Bibliotheca Mycologica v. 90, 502 p., 250 fig., 8 pl. col., in 8°, relié toilé, 1982. J. Cramer, 9490 Vaduz, Lichtenstein. Prix DM 200.-.

La première partie de ce travail traitant des méthodes mycocénologiques et des résultats sur la synécologie des champignons des prairies de Drente a été analysée dans Mycotaxon vol. 14(2):507.

Le présent volume complète le premier en présentant les documents ayant servi de base aux conclusions synécologiques déjà publiées: la 2e partie sur l'autoécologie des 346 taxa de macrochampignons récoltés (incluant des ascomycètes) et une 3e partie sur l'étude taxonomique des taxa trouvés.

La caractérisation autoécologique de chaque taxon (262 p.) comprend la valeur diagnostique du taxon pour la mycocénose, la fréquence temporelle et spatiale, le microhabitat, les caractéristiques du sol (capacité hydrique, pH, bases échangeables totales, phosphore échangeable, matière organique, rapport carbone/azote) et la périodicité de la fructification. La fréquence et la périodicité sont illustrées en graphes pour 102 taxa et en fonction du sol et de la phytocénose. De plus ces données autoécologiques sont comparées à celles de la littérature mycocénologique et phytosociologique pour chaque taxon. Certaines publications de floristique forestière et de taxonomie mycologique ont été aussi dépouillées bien que les informations sur le substrat ou l'habitat y sont souvent sommaires.

La description taxonomique de chaque taxon, la liste des récoltes, les figures et les commentaires couvrent 196 p. L'auteur déclare à juste titre: "The correct identification of the collected fungi is the most laborious, most difficult and most critical part of mycocoenological studies. For a good interpretation of the results of such studies, an account of the applied names is necessary, including descriptions of the critical taxa. Although this statement has often been made in a way or another, most mycocoenological studies lack such taxonomic notes."

Notons que cette exigence, à laquelle l'auteur répond d'ailleurs bien, vaut aussi pour toute publication sur l'écologie, la physiologie, la biochimie, la pathogénie et la toxicologie des champignons. Les descriptions sont précises. En plus des 145 illustrations au trait, des aquarelles dépeignent 39 espèces. Des commentaires taxonomiques très documentés mettent souvent en évidence les problèmes taxonomiques en attente de solution ou les positions taxonomiques prises par l'auteur. 26 taxa sont décrits comme nouveaux et 8 autres à titre provisoire. 15 nouvelles combinaisons sont aussi établies. Cette contribution à la taxonomie étend encore l'intérêt de ce travail.

Le soin et la précision qu'apporte l'auteur au relevé de ses observations sont évidents et mettent le lecteur en confiance. Il est souhaitable que des études semblables et d'un tel intérêt soient publiées.

DIE EPIPHYLLE PILZFLORA VON ACER PLATANOIDES L., EIN VERGLEICH VERSCHIEDENER STANDORTE IN BERLIN-TEGEL, par Martina KLOIDT et G. LYSEK, in Bibliotheca mycologica v. 86, 144 p., 31 fig., 2 fig. h.t., 14 x 22 cm, broché, 1982. J. Cramer, FL 9490 Vaduz, Lichtenstein.

Il s'agit d'un travail de fin d'études par le premier auteur. Le but est d'évaluer les variations spatiales et temporelles de la mycoflore de la phyllosphère du platane (*Acer platanoides*) dans quatre stations différemment éloignées du site urbain pollué. L'idée est bonne mais sa réalisation est imparfaite. En effet, sans encore mettre en cause le choix des stations, la faiblesse de l'échantillonnage d'une part et la méthode d'analyse utilisée d'autre part ne permettent pas d'obtenir des résultats répondant au but proposé. De chaque station et chaque mois une surface de 6 à 8 cm2 de limbe foliaire est analysée par mise en culture des eaux de lavage. Le nombre de colonies de chaque espèce en culture est considéré comme la fréquence de chaque espèce sur les feuilles et est exprimée en nombre de colonies par cm2 alors qu'il correspond au nombre de germes produits ou déposés sur la feuille par cm2, nombre dans lequel intervient la capacité différentielle de sporulation de chaque espèce. Les 51 espèces observées sont réparties en 3 goupes: 4 espèces de champignons levures (3 ind.) et levuriforme (*Aureobasidium pullulans*), 31 espèces de champignons filamenteux fructifiant en culture groupant 15 hyphomycètes, 14 sphaeropsidales et 2 zygomycètes (dont 16 espèces déterminées) et 16 espèces de champignons filamenteux non déterminés comprenant 1 basidiomycète, 8 sphaeropsidales et 7 mycelia sterilia. En vain, l'auteur consacre 36 pages à décrire sommairement ces champignons dont 34 espèces restent indéterminées et à en construire une clé dichotomique. Seul le groupe des 31 champignons filamenteux sporulants sert à l'analyse écologique. La fréquence du groupe des levures et levuriformes n'est d'ailleurs pas chiffrée. Etant donné ces lacunes, l'interprétation des résultats est des plus aléatoires. Il me semble que ce travail dût être achevé et largement abrégé avant d'être publié. Un comité d'édition devrait être établi par l'éditeur pour sa collection Bibliotheca Mycologica.

DIE ENTWICKUNG DER DOLIPORE VON COPRINUS RADIATUS (BOLT.)FR., par Sabine DESOLE, in Bibliotheca Mycologica v. 88, 85 p., 11 fig., 128 ph. b.n. hors texte, 14 x 22 cm., 1982. J. Cramer, FL 9490 Vaduz, Lichtenstein.

Sabine Desole constate à travers une bonne étude bibliographique une diversité croissante dans la constitution des dolipores décrits chez les Basidiomycètes, y compris certaines levures, et s'est posée la question de savoir si des différences ultrastructurales existent dans les dolipores suivant leur relation aux différentes cellules et en fonction du développement de celles-ci. Elle a donc choisi l'hyménium et a défini six stades de développement de la baside, de sa naissance à la maturité de ses spores, chez le *Coprinus radians*. A chacun des six stades, elle a étudié sous le microscope électronique le dolipore de la baside, des paraphyses, des cellules subhyméniales et de la trame, en y ajoutant le dolipore des filaments du stipe et du mycelium. Comme pressenti, elle met en évidence une évolution propre du dolipore, dans ses éléments constitutifs et en particulier dans son mécanisme de fermeture au cours du développement et de la maturation de chaque cellule et en fonction de la nature de celle-ci. Elle montre aussi la parenté existant entre le septopore des cellules hyphales et le dolipore dans le carpophore. Ces observations, toutes appuyées de bonnes électromicrophotographies, conduisent l'auteur à d'intéressantes considérations phylogénétiques basées sur l'ultrastructure porale. Ce travail retiendra l'attention.

MANUAL AND ATLAS OF THE PENICILLIA, par Carlos RAMIREZ, xvi +874 p., 227 fig., 252 pl. col., 38 pl. b.n., in 8°, relié toilé, 1982. Elsevier biomedical Press, P.O.Box 211, 1000 AZ Amsterdam, Pays-Bas.

Le *Manual of the Penicillia* de Raper et Thom (1949) était devenu un classique pour l'identification des *Penicillium* jusqu'à la parution en 1979 de la nouvelle monographie de J. Pitt *The genus Penicillium.* En effet le *Manual of the Penicillia* de Raper et Thom n'était plus à jour et demandait une revision en vue surtout de rejeter le concept holomorphique du genre *Penicillium* que pronaient ses auteurs et de prendre en considération les 140 espèces décrites depuis 1949. Carlos Ramirez, de Madrid, avait entrepris cette revision. Son *Manual and atlas of the Penicillia* apparaît comme une bonne mise à jour de celui de Raper et Thom, gardant la même méthode taxonomique et le même style, mais s'alignant sur les règles internationales de la nomenclature botanique.

Ramirez, comme Pitt, reconnaît le genre *Penicillium* comme anamorphique, mais se refuse, contrairement à Pitt, d'y inclure les anamorphes des espèces ascosporées d'*Eupenicillium* et de *Talaromyces*, ce qui rend sa monographie incomplète. Des 140 espèces décrites depuis 1949, Ramirez en accepte plus de 130, portant ainsi les 93 espèces anamorphiques de Raper et Thom à 227 espèces sans téléomorphe connu, tout en acceptant certaines synonymies d'espèces proposées par Samson, Stolk et Hadlok. Un certain nombre d'espèces ne restent cependant connues que par leur type et sa culture. Aussi ne faudra-t-il pas s'étonner si des taxonomistes préférant pour une quelconque raison une notion large d'espèce refusent les différences notées par Ramirez entre espèces monotypiques et synonymisent celles-ci à de plus larges espèces. Cependant à l'analyse fine, on s'apperçoit que la ségrégation par Ramirez de ces espèces, monotypiques parce que rares, se fonde non pas sur un seul caractère, mais sur un faisceau de caractères différents qui, au delà de la couleur et de la vitesse de croissance, ont trait à la morphologie de l'appareil conidien et à l'ornementation des conidies.

La méthode taxonomique de Ramirez est celle de Raper et Thom. Cela transparaît dans la valeur donnée aux caractères diagnostiques.

Les clés dichotomiques sont semblables, à quelques différences et additions près.Les subdivisions génériques et subgénériques sont inchangées et sans correction de leur nomenclature, mais augmentées de plusieurs nouvelles séries. Les descriptions suivent le même modèle et le même style. De même encore, la souche de référence, type ou autre, sur laquelle se base la description est la seule mentionnée et sans doute le lecteur regrettera de ne pas connaître les autres souches cultivées, et leur origine, que l'auteur a utilisées pour évaluer l'espèce et en établir ou vérifier la synonymie.

Il est aussi regrettable que les dessins n'aient pas été réalisés avec le même soin que les illustrations photographiques. En effet ces dessins sont sommaires voire schématiques et moins bons que ceux de Raper et Thom. On remarquera par exemple que les sclérotes repésentés aux figures 1 à 7 pour *Penicillium thomii, P. sclerotiorum, P. syriacum, P. turbatum, P. pusillum, P. donkii* et *P. indicum* sont la reproduction d'un même schema.

Par contre, l'illustration photographique polychrome de chaque espèce sur 3 milieux de culture, vue de face et d'envers, est bonne même si, dans l'exemplaire reçu, elle pèche par une teinte olivâtre généralisée. De plus, l'auteur s'est donné la peine de proposer au lecteur, et pour chacune des 227 espèces et variétés, une électromicrophotographie de l'ornementation des conidies. L'auteur y voit en effet un caractère diagnostique supplémentaire des espèces, comme il l'annonce dans l'introduction (p. 21). Cependant il ne l'utilise pas en termes descriptifs dans les descriptions d'espèces.

Le livre contient des imperfections de texte, en plus de coquilles typographiques. Citons, entre autres, p. 97, dernière ligne, 'type species' pour 'type locality', p.246, 'slightly azonate' pour 'slightly zonate', p. 368, fig. 132, '*Penicillium atramentosum* ...CBS 291.48' au lieu de '*Penicillium oxalicum* ...CBS 291.30', p. 498, 22e ligne, 'A. C. Stolk' au lieu de 'J.A. Meyer'.

La monographie de Ramirez, comme celle de Pitt d'ailleurs, mérite une sérieuse étude. Si Pitt précise beaucoup certains caractères culturaux, comme la vitesse de croissance, Ramirez a mis un accent nouveau sur le caractère d'ornementation des conidies. Les divergences entre les deux auteurs s'expliquent par la difficulté de la taxonomie des *Penicillium*. L'une et l'autre monographie y apportent une contribution précieuse qu'il serait regrettable de rejeter hâtivement.

A KEY TO THE LICHEN-FORMING, PARASITIC, PARASYMBIOTIC AND SAPROPHYTIC FUNGI OCCURING ON LICHENS IN THE BRITISH ISLES, par D. L. HAWKSWORTH, extrait de Lichenologist 15(1):1-14, 141 fig., in 8°, 1982. The British Lichen Society, Castle Museum, Norwich NR1 3JU, UK. Prix £ 3.- or 2.- pour les membres.

Les lichens sont une niche à champignons trop peu explorées jusqu'à présent. Depuis plus de 10 ans, l'auteur a porté son attention sur cette flore où se manifestent aussi bien les champignons symbiontes et parasymbiontes que les parasites et saprophytes. Dès 1972, il avait dépouillé toute la littérature existante sur cette mycoflore et avait construit une clé provisoire d'identification. A la suite de ses nombreuses récoltes dont il a publié par ailleurs les résultats, il nous propose ici une version revue et corrigée de cette clé dichotomique. 183 champignons appartenant à 79 genres, pour la plupart Ascomycètes, quelques Coelomycètes et Hyphomycètes et deux Basidiomycètes, y sont inclus. La nomenclature des taxa antérieurs à 1980 a été revisée par Hawksworth et al. dans *Lichenologist* 12: 1-115, 1980. La clé n'inclut donc que les synonymies établies dans la suite. Pour chaque taxon amené par la clé une référence bibliographique est donnée, et éventuellement un dessin de spores ou de conidies. L'index alphabétique des taxa est aussi l'index numérique des illustrations. Ainsi ce livre est non seulement une clé d'identification, mais aussi réellement une clé à la littérature mycologique sur le sujet et, selon le souhait de chacun, une clé vers de nouvelles découvertes.

CHARACTER ANALYSES OF SELECTED RED YEASTS, by G.S. DE HOOG edit., in Studies in Mycology n° 22, 74 p., 59 fig., in 8°, 1982. Centraalbureau voor Schimmelcultures, Baarn, Nederland. Price HFl 24.-.

CBS strains of the red yeast *Rhodosporidium infirmo-miniatum, Rh. toruloides, Sporidiobolus pararoseus, Sporobolomyces roseus, Sp. albo-rubescens,* as classically identified are studied in their morphogenesis, ultrastructure, biochemical characteristics (volatiles, carotenoids, sterols, fatty acids, carbohydrates) and pyrolysis mass spectrometry in order to search for a correlation between those characteristics and the classical diagnostic criteria. The author describes the pleomorphic conidiogenesis that may be multilateral, sympodial, basipetal, arthric, ballistosporic (2 types), chlamydosporic(2 types) and endogenous, one single strain showing up to sic distinct morphs. The production of pseudo-teliospres (called "teliospores-mimics") is also considered anamorphic. Only *Rhodosporidium infirmo-miniatum* shows endogenous conidiation. Although the observed features appear to be variable, *Rhodosporidium infirmo-miniatum,* also because of its biochemical and ultrastructural characteristics, shows more affinities to the Filobasidiaceae than to the Sporidiobolaceae. The paper is surely interesting, but to some extent confuse, especially in the morphological part. The observed data are not described for each strain or species neither separately nor before any comparison and interpretation. It is therefore not easy to find out which of the ten distinct types of morph are present in each of the strains or species studied.

HYDROPUS (BASIDIOMYCETES - TRICHOLOMATACEAE - MYCENEAE), par Rolf SINGER, in Flora Neotropica n° 32, 153 p., 26 fig., in 8°, broché, 1982, The New York Botanical Garden, Bronx, New York 10458, USA. Prix US $ 25.00.

Cette monographie est en fait la première du genre *Hydropus*, un genre d'agaricales constitué d'espèces surtout tropicales et néotropicales, situé aux confins de *Mycena*, d'*Omphalia* et de *Collybia*. Ce groupe taxonomique, d'abord reconnu par Kühner, prit plus d'importance avec les explorations de Dennis et de Singer en Amérique du Sud. Aux 40 espèces que contenait donc le genre, dont 30 furent décrites par Singer lui-même, l'auteur ajoute aujourdhui 43 espèces, 6 combinaisons et 11 variétés nouvelles. La distinction du genre d'avec *Mycena, Dennisiomyces, Dermoloma, Delicatula, Clitocybula, Gerronema, Hemimycena* et *Pseudohyatula* est sans doute délicate mais est clairement exposée. Le genre est divisé en 3 sections et 7 sous-sections. Les affinités entre sections et vis-à-vis des sections de genres voisins ont été évaluées par méthode numérique et confirment la cohérence du genre.

BASIDIUM AND BASIDIOCARP,EVOLUTION, CYTOLOGY, FUNCTION AND DEVELOPMENT, par Kenneth WELLS et Ellinor K. WELLS, in Springer Series in Microbiology, M.P. STARR ed., 187 p., 117 fig., relié toilé, 1982. Springer Verlag, 175 Fifth Ave, New York, NY 10010, USA, Berlin-Heidelberg, Deutschland. Prix DM 89.-, US $ 40.-.

Ce livre a pour but de réunir les connaissances acquises sur la baside et le carpophore des Basidiomycètes par les chercheurs de disciplines très diverses, afin de contribuer à une réévaluation des concepts taxonomiques et biologiques existants. K. Wells remarque justement que "there are significant advantages of peeking into de backyards of others: possibly even a visit over the fence would be instructive for many".

Dans le 1er chapitre, F. Oberwinkler montre combien la distinction entre Homobasidiomycètes et Hétérobasidiomycètes proposée par Patouillard en 1900, basée sur la morphologie et la germination de la baside, conduit bien à une phylogénie et à l'origine de ces champignons. Sans dénier le progrès apporté par la microscopie électronique, il remarque que beaucoup reste encore à découvrir sur la baside, même par la microscopie optique. Par une étude fouillée et comparative de la morphologie basidiale dans la plupart des ordres de Basidiomycètes et jusqu'à leurs formes levures, l'auteur démontre de très intéressantes relations.

D.J. Mac Laughlin (Chap. 2) étudie l'ontogénie de la baside et de la basidiospore au niveau ultrastructural et cytochimique de la cellule, laissant à C. Thielke (Chap. 3) le soin de suivre l'évolution structurale du noyau au cours de la division méiotique. Leur matériel expérimental est représenté par *Coprinus cinereus.*On découvre entre autres le développement endogène des stérigmates basidiaux, le mécanisme de fermeture du dolipore basidial, les caractères de la division du noyau communs à tous les champignons supérieurs et ceux propres aux Homobasidiomycètes.

B.C. Lu (Chap. 4) étudie l'inhibition par les facteurs physiques, température, lumière, sur le déroulement des phases de la méiose et sur la fréquence des recombinaisons. Les éléments d'un système déterminant du crossing over sont donc mis en évidence. C'est un pas dans la connaissance des mécanismes de la reproduction et de l'évolution.

I. Uno et T. Ishikawa (Chap. 5)étudient les facteurs chimiques, tel que l'adénosine monophosphate, dans la formation du basidiocarpe, tandis que H.E. Gruen (Chap. 6) et G.W. Goodway (Chap. 7) examinent les divers paramètres de l'élongation du stipe des Agaricales, et spécialement le rôle du pileus et du mycélium d'une part, des substances de croissance, des nutrients et des métabolites cellulaires (chitine, protéine, glycogène, glucose, tréhalose) d'autre part sur *Flammunila velutipes* ou sur *Coprinus cinereus.*Ces derniers chapitres donnent à la synthèse *Basidium and Basidiocarp* de K. Wells et E.K. Wells un intérêt nouveau, celui de faire le point sur la recherche de la régulation de la production de carpophores en culture industrielle de champignons.

A NOMENCLATURAL REVISION OF F.J. SEAVER'S NORTH AMERICAN CUP-FUNGI (OPERCULATES), par Donald H. PFISTER, in Occasional Papers of the Farlow Herbarium of Cryptogamic Botany n° 17, 32 p., 15 x 22 cm., 1982. Farlow Herbarium, Harvard University, Cambridge, Mass. USA.

Ce petit fascicule sera très utile pour tous les mycologues ayant utilisé ou utilisant encore le *North American Cup-Fungi* de Seaver dans l'identification des Discomycètes operculés. Les 359 noms d'espèces apparaissant dans le premier volume de l'ouvrage de Seaver sont mis en correspondance avec les noms corrects en accord avec la taxonomie et la nomenclature modernes. Un index de ces derniers permet le chemin inverse. Des références aux monographies récentes des Discomycètes operculés sont ajoutées dans la plupart des cas. Au sujet des 35 taxa de Seaver, des commentaires permettent de mieux comprendre encore la position adoptée par l'auteur.

UEBER DIE HETEROGENE ASCOMYCETENGATTUNG PLEOSPORA RABH. VORSCHLAG FUR EINE AUFTEILUNG, par P.G. GRIVELLI, Dissertation E.T.H. n°7318, 215 p., 43 fig., 15 x 22 cm., broché, 1983. ADAG Administration & Druck AG, Zurich Switzerland.

Depuis la monographie de Wehmeyer, *A World Monograph of the Genus Pleopora and its Segregates* (1981), le concept générique de *Pleospora* Rabh. s'est avéré hétérogène. L'auteur propose donc ici la revision de plus de 100 espèces et le reclassement de près de la moitié dans 11 autres genres d'ascomycètes bituniqués: *Pyrenophora, Leptosphaerulina, Massariosphaeria, Montagnula, Nodulosphaeria, Cilioplea, Leptosphaeria, Paraphaeosphaeria, Pleomassaria, Pseudopleospora Dacampia.* 106 espèces dont 12 nouvelles sont donc redécrites sur base des matériaux types et, pour la moitié d'entre elles, sur base de cultures monospermes. Des anamorphes sont observés: *Stemphylium* de *Pleospora gigaspora, P. herbarum* et *P. triglochinicola, Alternaria* de *P. scirpi, P. scrophulariae* et *P. discors, Drechslera* de *Pyrenophora trichostoma* et *Dendryphion* de *Pleospora papaveracea.* A part quelques imperfections textuelles, le lecteur regrettera peut-être la sobriété des illustrations de bon nombre d'espèces (consistant en 2 ascospores ou 1 seule). Cependant ce travail digne de l'école de E. Gaümann, de J.A. von Arx et de E. Müller représente un grand nombre d'investigations précises et une contribution utile.

FUNGHI BUONI A CATTIVI DI COLLINA E DI PIANURA. par N. TOGUI, 232 p., 108 pl. col., 16 x 24 cm., cartoné relié, 1982. Mundici e Zanetti Ed. Modena, Italia. Prix Lire 40.000.-.

Cent espèces de champignons asco- et basidiomycètes comestibles sont décrites dans leurs caractères externes seulement et dénommées dans une nomenclature traditionnelle. Elles sont illustrées pour la moitié de photographies en couleurs de pleine page, pour l'autre moitié de dessins. Cet album destiné à l'amateur attirera surtout le chasseur d'images.

LES CHAMPIGNONS : 100 RECETTES DE CHEZ NOUS ET D'AILLEURS. par Clémence LAMBINON-ADAM, 158 p., 16 x 23 cm, broché, 1983. Société Botanique de Liège, Université de Liège, B 4000 Liège, Belgique. Prix FB 450.-.

Un livre de mycogastronomie. 100 recettes: essayez-les et vous en goûterez la saveur. Elles ont le mérite d'être appropriées à chacune des 45 espèces de champignons comestibles considérés. De plus, l'auteur avertit le lecteur des précautions à prendre dans certaines préparations. Chaque recette est de plus qualifiée de facile ou difficile, d'économique ou coûteuse, de bonne à très savoureuse. Ecrit dans un language facile, ce livre contient encore un lexique pour aider le lecteur.

Un nouveau périodique mycologique :

MYCOLOGIA HELVETICA, Vol. 1, N° 1, 65 p., 23 August 1983. Periodical of the Association of Swiss Mycological Societies, Editor H. GÖPFERT, Alpenblickstrasse 53, CH 8330 Rüti, Switzerland. Subscription: SFr 10.- or 14.- (abroad) per year.

This new journal is edited by the Mycological Societies of Switzerland, starting in 1983. Each volume will contain 10 fascicles, two of them issued each year. The scope of the journal covers systematics, ecology, experimental studies, genetics, medical aspects, mycotoxicity of preferably higher fungi (Asco- and Basidiomycetes), industrial mycology being explicitely excluded. The journal accepts manuscripts ready for offset printing in any of the four languages English, French, German or Italian. A charge is billed for colour plates.

The first issue contains 7 papers on *Cortinarius* subg. *Telamonia* (M. Moser), *Tricholoma* sect. *Tricholoma* (H. Clémençon), *Gastrosporium simplex* (O. Monthoux), *Lyophyllum helvella* (Boudier) comb.nov. (H. Clémençon), *Ramaria* (E. Schild) and on the amyloidity of spores (G. Lazzari). The papers are illustrated, two of them with a colour plate.

The journal has a good look and its price is feasible. With our best wishes of succes.

CO-EDITORS OF MYCOTAXON

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MYCOTAXON

N INTERNATIONAL JOURNAL DESIGNED TO EXPEDITE PUBLICATION
OF RESEARCH ON TAXONOMY & NOMENCLATURE OF FUNGI & LICHENS

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MYCOTAXON

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AN INDEX TO THE TAXA DESCRIBED BY ROLAND THAXTER EXCLUDING THE LABOULBENIALES

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In the course of curatorial work on the Farlow Herbarium collections of fungi, work was done on the collections of Roland Thaxter. The first part of this work was published in this journal in 1982 in which Thaxter's collecting localities were detailed. In this contribution, a survey of the taxa described by Thaxter was made. The survey excluded, for the time being, the Laboulbeniales on which Thaxter had spent the major part of his research activities.

At the time of Thaxter's death in 1932, his collections were given to the Farlow Herbarium. When the collections were processed, new labels were prepared which had to be transcribed from Thaxter's often minute, italic hand. At the same time, an accession number was added and a card file created which correlated names and accession numbers.

It is beyond the scope of this paper to trace all of the names originating from Thaxter's collections. He had a keen and discerning eye and he knew the mycological literature well enough to realize when he had a rare and interesting find. He also was generous with collections. He sent specimens to many people for identifications--for example, Gilkey received Tuberales, Durand got Discomycetes, Zeller was given Gasteromycetes--in short, material was spread around. *Protogaster* Thaxter, described by Zeller in 1934, is an example of an interesting fungus which got into the literature through Thaxter's generosity. His collections at the Farlow Herbarium have continued to be a source of names and materials, particularly in the Entomophoraceae and the Endogonaceae.

Thaxter was not a strict adherent to the type system, and it should be remembered that his was the generation which saw its implimentation. In some cases, both on labels and in his papers, he used the word "type"; in most cases, he merely listed a locality or a series of localities. Part of our goal has been to see that type or putative type material has been marked as completely and accurately as possible.

Below, Thaxter's new genera are listed first with type species given, as far as is known, and then there follows alphabetically a list of his new specific epithets. Bibliographic sources are given along with data from the original description and the accession number.

Genera Described by R. Thaxter Except Laboulbeniaceae

AMPHOROMORPHA Thaxter [?Laboulbeniales]
Bot. Gaz. 58: 249. 1914.
Type species (only original species): *Amphoromorpha entomophila* Thaxter.
Ainsworth & Bisby indicate that 3 species are known.

APOSPORELLA Thaxter [Hyphomycetes]
Bot. Gaz. 69: 11. 1920.
Type species (only original species): *Aposporella elegans* Thaxter.

ARAIOSPORA Thaxter [Leptomitales]
Bot. Gaz. 21: 326. 1896.
Type species: *Araiospora pulchra* Thaxter.
Araiospora pulchra Thaxter and *A. spinosa* (Cornu) Thaxter were originally described. *A. pulchra* was listed as type species by Clements and Shear (Genera of fungi, p. 240. 1931).

BLAKESLEA Thaxter [Mucorales]
Bot. Gaz. 58: 353. 1914.
Type species (only original species): *Blakeslea trispora* Thaxter.
See Mehrotra & Baijal, J. Elisha Mitch. Sci. Soc. 84: 207. 1968.

CANTHAROSPHAERIA Thaxter [Sphaeriales]
Bot. Gaz. 69: 3. 1920.
Type species (only original species): *Cantharosphaeria chilensis* Thaxter.

CEPHALIOPHORA Thaxter [Hyphomycetes]
Bot. Gaz. 35: 157. 1903.
Type species (selected Clements and Shear, 1931): *Cephaliophora tropica* Thaxter.
Two species were originally mentioned: that listed above and *C. irregularis* Thaxter.

CHANTRANSIOPSIS Thaxter [Hyphomycetes]
Bot. Gaz. 58: 246. 1914.
Type species (selected by Clements and Shear, 1931): *Chantransiopsis decumbens* Thaxter.

Aside from the species listed above, two others were mentioned: *C. stipatus* Thaxter and *C. xantholini* Thaxter.

COREOMYCETOPSIS Thaxter [?Hyphomycetes]

Bot. Gaz. 69: 13. 1920.

Type species (only original species): *Coreomycetopsis oedipus* Thaxter.

DESMIDIOSPORA Thaxter [Hyphomycetes]

Bot. Gaz. 16: 203. 1891.

Type species (only original species): *Desmidiospora myrmecophila* Thaxter.

Harry C. Evans (late of CMI; unpublished comm. Richard Humber) has confirmed from a rediscovery of *Desmidiospora* that it is a dry-spored *Hirsutella* which produces large, discoid, brown chlamydospores.

DISSOPHORA Thaxter [Mucorales]

Bot. Gaz. 58: 361. 1914.

Type species (only original species): *Dissophora decumbens* Thaxter.

Two species according to Ainsworth & Bisby.

ENDOSPORELLA Thaxter [Hyphomycetes]

Bot. Gaz. 69: 16. 1920.

Type species (only original species): *Endosporella diopsidis* Thaxter.

GONATORRHODIELLA Thaxter [Hyphomycetes]

Bot. Gaz. 16: 202. 1891.

Type species (only original species): *Gonatorrhodiella parasitica* Thaxter.

See Trans. Bot. Soc. Edinb. 35, 1949 = *Nematogonium fide* Hughes.

HAPLOSPORANGIUM Thaxter [Mucorales]

Bot. Gaz. 58: 362. 1914.

Type species: *Haplosporangium bisporale* Thaxter.

Two species were originally described: *H. bisporale* and *H. decipiens*. *H. bisporale* was listed as type species by Clements and Shear (The Genera of Fungi. p. 237. 1931).

HELICOCEPHALUM Thaxter [Mucorales]

Bot. Gaz. 16: 201. 1891.

Type species (only original species): *Helicocephalum sarcophilum* Thaxter.

See Mycologia 1943.

HETEROCEPHALUM Thaxter [Hyphomycetes]

Bot. Gaz. 35: 157. 1903.

Type species (only original species): *Heterocephalum aurantiacum* Thaxter.

LABOULBENIOPSIS Thaxter [Laboulbeniomycetes]
Bot. Gaz. 69: 17. 1920.
Type species (only original species): *Laboulbeniopsis termitarius* Thaxter.
Meredith Blackwell (1976, Mycologia 68, 541-550) found good ultrastructural evidence for fungus being an ascomycete allied to Laboulbeniales but excluded from that order by several morphological features.

MEDEOLARIA Thaxter [Medeolariales]
Proc. Amer. Acad. Arts Sci. 57: 432. 1922.
Type species (only original species): *Medeolaria farlowii* Thaxter.

MUIARIA Thaxter [Hyphomycetes]
Bot. Gaz. 58: 241. 1914.
Type species (selected by Clements and Shear, 1931): *Muiaria gracilis* Thaxter.
Besides the above, three other species were described at the same time by Thaxter: *M. lonchaeana*, *M. armata*, *M. repens* and several herbarium names can be found in the Farlow collections.

MUIOGONE Thaxter [Hyphomycetes]
Bot. Gaz. 58: 239. 1914.
Type species (only original species): *Muiogone chromopteri* Thaxter.

MYRIOBLEPHARIS Thaxter [anomaly]
Bot. Gaz. 20: 484. 1895.
Type species (only original species): *Myrioblepharis paradoxa* Thaxter.
Waterhouse (Trans. Brit. Mycol. Soc. 28: 94. 1945) and Koch (Mycologia 56: 436. 1964) discuss this genus which is the result of the interaction between a ciliate protozoan and an Oomycete. It is an anomaly.

MYXOBACTER Thaxter [Myxobacterales]
Bot. Gaz. 17: 403. 1892.
Type species (only original species): *Myxobacter aureus* Thaxter.

MYXOCOCCUS Thaxter [Myxobacterales]
Bot. Gaz. 17: 403. 1892.
Three species were originally listed by Thaxter when the genus was described. They are: *M. rubescens*, *M. virescens*, and *M. coralloides*. *M. fulvus* (Cohn emend. Schroeter) Jahn has been considered a type species in Bergey's Manual.

SIGMOIDEOMYCES Thaxter [?Hyphomycetes]
Bot. Gaz. 16: 22. 1891.
Type species (only original species): *Sigmoideomyces dispiroides* Thaxter.

TERMITARIA Thaxter [Hyphomycetes]
Bot. Gaz. 69: 3. 1920.

Type species (selected by Clements and Shear, 1931): *Termitaria snyderi* Thaxter.

The other species listed with the original description is *T. coronata* Thaxter.

SPECIES INDEX

americana Dispira
Bot. Gaz. 20: 517. 1895.

On rat dung from Greenville, Ohio [W. H. Rush], parasitic on *Mucor* [accession no. 352].

Thaxter subcultured on dung the original collection and there are a number of packet and slides derived from subcultures. No. 605 of the Reliquiae Farlowianae is one of these. The accession numbers of the others are as follows: 2685, 3333, 6147, 6148, 6150, 6152, 6155, 6153, 6157.

americana Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 179. 1888.

Diptera: *Musca domestica*, *M. vomitoria*, *Lucilia caesar*, and numerous other large flies. New England and North Carolina.

There are four specimens all from New England collected before 1888. One, obviously mislabeled, was collected in 1889 and labeled "type."

americana Wynnea
Bot. Gaz. 39: 246. 1905.

Growing on the ground in rich woods, Burbank, East Tennessee, and Cranberry, North Carolina.

There are several collections with this data. Pfister (1979) typified the species with a North Carolina collection, accession number 3651, portions of which were issued in the Reliquiae Farlowianae no. 647.

americanum Rhipidium
Bot. Gaz. 21: 327. 1896.

On various decaying vegetable substances in ponds and ditches, vicinity of Cambridge, Massachusetts, and of Kittery Point, Maine.

There are seven slides of material with this name collected in May, July and August of 1895.

androgynus Sapromyces
Bot. Gaz. 21: 329. 1896.

On submerged sticks in ponds and ditches, vicinity of

Cambridge, Massachusetts.

There is a single collection which can be taken as type material, accession no. 1401. It, however, was made in Weston, Mass. which is only the vicinity of Cambridge in the broadest sense. There are two other collections in the herbarium with this name and these were collected both further afield and at a later date.

apiculata Empusa

Mem. Boston Soc. Nat. Hist. 4(6): 163. 1888.

Lepidoptera: larva of *Hyphantria textor*, imagines of *Tortrix* sp., *Deltoid* sp., *Petrophora* sp. (geometrid). Diptera: numerous genera of small flies and gnats. Hemiptera: imago of a species of leaf hopper (*Typhlocyba*). Maine and North Carolina.

There is confusion over the type collection; the following accession numbers refer to the species: 2744, 4329, 4330, 4331, 4332, 4337, 4338, 4417, 6412, 6417, 6418, 6420.

arenacea Endogone

Proc. Amer. Acad. Arts 57: 317. 1922.

Near margin of brook, Maraval Valley, Port of Spain, Trinidad, B.W.I., in sand under trash (April, 1913).

Accession no. 5043 has been marked type. It includes both specimen and slides. Additional slides 6180-82 are from the same locality.

armata Muiaria

Bot. Gaz. 58: 244. 1914.

On the legs of *Drosophila* sp., no. 2178, Sarawak, Borneo [Feb. 1911]. [accession number 7206].

apiculatus Chondromyces

Bot. Gaz. 23: 405. 1897.

On dung of antelope from Liberia, Africa [accession no. 4481].

A large series of slides also exist with the numbers 5604-17.

aurantiacum Heterocephalum

Bot. Gaz. 35: 157. 1903.

On dung of toad, Kingston, Jamaica [1891]; on goat dung, Philippine Islands.

The collection numbered 5156 was apparently the one which Thaxter considered primary. It was issued as no. 660 in the Reliquae Farlowianae and is the collection from Jamaica. No. 603 is the Philippine collection. No. 604 is from Jamaica and was cultured from mongoose dung. Several slides also exist.

aureus Myxobacter

Bot. Gaz. 17: 403. 1892; 18: 29. 1893.

On very wet wood and bark in swamp. Kittery Point, Me., Belmont, Mass.

No specimen from Belmont was discovered in the herbarium and only one from Kittery Point. The Kittery Point collection (no. 5704) was made in September, 1892. Accession numbers are 4504, 5702-5706.

bisporale Haplosporangium

Bot. Gaz. 58: 363. 1914.

From pig dung, Burbank, E. Tennessee; dung of skunk and of field mice and at Intervale, New Hampshire, on dung of squirrels.

Several specimens are present in the herbarium which have all or some of the information listed above. One (no. 4154) on squirrel dung is from Intervale, Nov. 1901, and has "type" written on it in Thaxter's hand. No. 4155 from Kittery Point is on mouse dung and slide no. 1956 is from Kittery Point and is on skunk dung. There are two collections made in 1921 on skunk dung.

blattina Amphoromorpha

Bot. Gaz. 69: 20. 1920.

On the axis of the antennae of a dark wingless and a pale winged blattid, nos. 2938 and 2939, Grand Etang, Grenada, B.W.I.

Nothing has been located.

borealis Endogone

Proc. Amer. Acad. Arts Sci. 57: 318. 1922.

In *Sphagnum*, Little Metis, Provence Quebec, E. C. Jeffrey [accession no. 5044 and slides 6184 and 6185].

braziliensis Thaxter ex Linder Coemansia

Farlowia 1: 64. 1943.

Without locality, on Brazilnuts (*Betholletia excelsa*) in laboratory culture, R. Thaxter [accession no. 6398].

canadensis Endogone

Proc. Amer. Acad. Arts 57: 317. 1922.

In *Sphagnum*, Little Metis, [Provence Quebec], E. C. Jeffrey [accession no. 5045, 5046; slide no. 6186-89].

candida Thaxter in Linder Everhartia

Ann. Missouri Bot. Gard. 16: 337. 1929.

Type labeled is from Kittery Point and is dated Aug. 30, 1890. There are 7 authentics from various localities.

caroliniana Empusa

Mem. Boston Soc. Nat. Hist. 4(6): 167. 1888.

Diptera: imagines of *Tipula* sp., North Carolina.

Lectotypification is necessary. There are three collections, all now labeled authentic, which were collected in July 1887 in North Carolina but they are from different collection sites. They are labeled nos. 4670, 4310, 4311. There is also one slide of material from Connecticut.

catenulatus Chondromyces

Bot. Gaz. 37: 410. 1904.

On a rotten poplar log, Hanover, N.H. col. Lyman [accession no. 4518; slide no. 5635].

There are 14 slides, nos. 5630-43 and three other specimens from Hanover (nos. 7310, 7258, 4517). All were collected by Lyman.

chilensis Cantharosphaeria

Bot. Gaz. 69: 3. 1920.

On the elytra, legs, etc. of a cucujid beetle found in decaying vegetable material, Corral, Chile.

No material has been located.

chromopteri Muiogone

Bot. Gaz. 58: 239. 1914.

On the inferior surface of the abdomen of *Chromopterus delicatulum* Beck., Kamerun, West Africa.

There are three slides in the collection (nos. 7233-7235) all with the same information.

cirrhosus Myxococcus

Bot. Gaz. 23: 409. 1897.

On grouse dung from Readville, Mass. Nov. 1896 [accession no. 4495, slide no. 5712].

There is an additional specimen from Readville which is on rabbit dung.

compositum Polyangium

Bot. Gaz. 37: 413. 1904.

On rabbit dung from Sandy Run, S.C. [accession no. 4565; slide no. 5759-60].

compressa Enterobryus

Bot. Gaz. 69: 20. 1920.

Growing wholly exposed on the anal plates of a large species of *Passalus*, Dominica, B.W.I., no. 2170, M.C.Z. [slide nos. 6314-19].

coralloides Myxococcus

Bot. Gaz. 17: 404. 1892.

On decaying lichens, Cambridge, Mass. Spring 1892 [accession no. 4498; slides 5715-5721 and 5723].

Two other collections are present in the herbarium which are dated much later. They were on dung and are from California and Argentina.

coronata Termitaria

Bot. Gaz. 69: 8. 1920.

On *Eutermes morio* var. *St. Luciae*, Grand Etang, Grenada, B.W.I. [slide nos. 7080, 7083-7087].

No. 7079 also collected at the same time is labeled as having occurred on *Eutermes cayennensis*.

corticii Thaxter *ex* Linder Martensella

Farlowia 1: 59. 1943.

New Brunswick, Campobello, on *Corticum* sp. W. G. Farlow [accession no. 6393].

cruentus Myxococcus

Bot. Gaz. 23: 409. 1897.

On cow dung, Burbank, Tennessee, [Aug. 1896] [accession no. 4509, slides 5725-26].

curvata Muiaria

Bot. Gaz. 69: 9. 1920.

On the superior tip of abdomen and wing of a small drosophilid fly, Bocas de Toto, Panama (Rorer) no. 2525 [slide no. 7214].

decipiens Haplosporangium

Bot. Gaz. 58: 364. 1914.

Cultivated from dung of cave dwelling *Selenodon* from Hayti [Oct. 1908]. [slide nos. 1955, 6640].

decumbens Chantransiopsis

Bot. Gaz. 58: 248. 1914.

On the inferior surface of an undetermined staphylinid beetle, Malan, Java (Rouyer). [slide no. 9067 and 9068].

decumbens Dissophora

Bot. Gaz. 58: 361. 1914.

On dung of wood mouse from vicinity of Cambridge [accession no. 348].

diopsidis Endosporella

Bot. Gaz. 69: 16. 1920.

On the terminal claws of the legs of *Diopsis* sp., nos. 2716, 2717, Kamerun, W. Africa.

Both of these collections are present in the herbarium. Also no. 8997, marked "type" is present.

dipterigena Empusa

Mem. Boston. Soc. Nat. Hist. 4(6): 177. 1888.

Diptera: small tipulae; other small flies or gnats belonging especially to the Mycetophilidae. Maine, New Hampshire, Massachusetts, North Carolina.

A number of collections are present and lectotypification is necessary.

disciformis Myxococcus

Bot. Gaz. 37: 412. 1904.

On muskrat dung from Stony Brook, Mass. [1900] and on deer dung from New Hampshire. [accession nos. 5730 and 5731].

Several other collections are present in the herbarium but none of them agree with either of the collections given above. There is no sign of the collection from New Hampshire.

dispiroides Sigmoideomyces

Bot. Gaz. 16: 22. 1891.

On rotten wood. Burbank, Tennessee [Sept. 1887], [accession no. 1310].

echinospora Empusa (Entomophthora)

Mem. Boston Soc. Nat. Hist. 4(6): 180. 1888.

Diptera: imago of *Sapromyza longipennis* and rarely other smaller *Diptera*. Maine, New Hampshire, North Carolina.

Lectotypification is necessary.

echinulata (Thaxter) Thaxter Cunninghamella

Rhodora 5: 98. 1903.

See *Oedocephalum echinulatum.*

echinulatum Oedocephalum

Bot. Gaz. 16: 17. 1891.

On cheese and cheesy paper, Massachusetts [accession no. 1056].

elegans Aposporella

Bot. Gaz. 69: 12. 1920.

On the wings of a small fly, Kamerun, W. Africa no. 2645 [slides 5863 and 5864].

entomophila Amphoromorpha

Bot. Gaz. 58: 251. 1914.

On the bristles of *Diochus conicollis* Motsch., and species of two other genera of Staphylinidae; also on a species of (?) *Labia*, Manila, Philippines (C. S. Banks).

entomospora Taphrina

Bot. Gaz. 50: 437. 1910.

In foliis vivis lutescentibus *Nothofagi antarcticae* var. *bicrenatae* et var. *uliginosae*. Punta Arenas, Magellanes, Chile.

The several specimens in FH are unmarked but all appear to have been gathered at the same time.

erectus Chondromyces

Bot. Gaz. 23: 407. 1897.

On horse dung in laboratory cultures. Cambridge, Mass. [1893] [accession no. 5658].

Farlowii Medeolaria

Proc. Amer. Acad. Arts 57: 432. 1922.

Magnolia, Ma., Gerrish Island, Kittery Point and Chocorua.

Selection of material will be necessary.

fasciculata Endogone

Proc. Amer. Acad. Arts 57: 308. 1922.

In *Sphagnum*. Little Metis, [Province Quebec], E. C. Jeffrey. [a single specimen and slide nos. 6191-6194].

fasciculata Monoblepharis

Bot. Gaz. [Crawfordsville] 20: 439. 1895.

On submerged sticks Weston and Medford, Mass. [accession no. 773, slide number 6798]; the only extant material is from Weston, May 19, 1895.

fasciculata Muiaria

Bot. Gaz. 69: 9. 1920.

On a dull brown drosophilid fly, no. 2749, Kamerun, W. Africa [accession no. 7211 and 7212]. [Additional material is represented by 7213].

floriforme Thaxter in Kern Gymnosporangium

Bull. Torrey Bot. Club 35: 503. 1908.

The original description cites specimens *Crataegus spathulata* and *Sabina virginiana*. An Alabama collection (March 11, 1897, F. S. Earle) is cited as type. It is not in FH. Thaxter issued a Daytona, Fla. specimen as no. 728 in the Reliquae Farlowianae.

fuscum (Schrot.) Thaxter Polyangium

Bot. Gaz. 37: 414. 1904.

= *Cystobacter aureus* Thaxter.

geometralis Empusa (Entomophthora)

Mem. Boston Soc. Nat. Hist. 4(6): 170. 1888.

Lepidoptera: imagines of geometrid moths (*Petrophora*,

Eupithecia, Thera, etc.)
Kittery, Me. [accession no. 6628] [Sept. 1886].

gracilipes Chondromyces
Bot. Gaz. 23: 406. 1897.

On rabbit dung, Arlington, Mass. [accession no. 4514, slide nos. 5662-63].

The original description states Arlington as the location of the collection; however, the packet says Lexington, the neighboring town. Thaxter was known to collect on a small pond and adjacent woods on the border between the two towns.

gracilis Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 185. 1888.

Diptera: on very minute gnats, Cullowhee, N.C. [July, 1887]. [accession no. 4675].

gracilis Muiaria
Bot. Gaz. 58: 243. 1914.

On the legs and inferior surface of the abdomen of *Leucophenga* sp. no. 2299, Kamerun, West Africa (Schwab). [Oct. 1911] [slide no. 7209].

guatemalensis Thaxter *ex* Linder Coemansia
Farlowia 1: 65. 1943.

Guatemala, Los Amates, on pig dung sent by W. A. Kellerman and placed in moist chamber, 1908, R. Thaxter [accession no. 6389].

hypoxyis Urocystis
Ann. Rept. Conn. Agr. Exp. Sta. 1890: 153. 1890.

On *Hypoxys erecta* L., June-Aug., Westville, Conn. [July 1889], [accession no. 1476].

incrassata Endogone
Proc. Amer. Acad. Arts 57: 305. 1922.

Under spruce about two inches below the surface of the cover; with a distinct alliaceous odor. Gerrish Island, Kittery Point, Maine; August, 1896. [accession no. 5067].

insignis Monoblepharis
Bot. Gaz. 20: 438. 1895.

On submerged sticks in pools and ditches, Weston and Medford, Mass., and Kittery Point, Maine.

Slide no. 6803 from Weston (May 1895) has been marked type. Slides 6801, 6804 are perhaps part of the same collection. The Kittery Point slide no. 6802 was collected July 4, 1895. No material from Medford has been found.

irregularis Cephaliophora
Bot. Gaz. 35: 158. 1903.
On mouse dung, Porto Rico [slide no. 6005].

kamerunensis Thaxter *ex* Linder Coemansia
Farlowia 1: 63. 1943.
Cameroons, W. Africa, cultured on dung sent by Geo. Schwab by R. Thaxter [accession no. 6392].

lacteus Thaxter *ex* J. Peterson Myxococcus
Mycologia 50: 631. 1958.
On bark, Chocorua, New Hampshire, W. G. Farlow, 1907 [accession no. 4562].

lageniformis Empusa (Triplosporium)
Mem. Boston Soc. Nat. Hist. 4(6): 169. 1888.
Hemiptera: usually aphids on *Betula populifolia*. Maine, Massachusetts, North Carolina.

A number of collections in the herbarium are eligible for selection as type. They are numbers 4653, 4313 and slides 6510 to 6519.

lampyridarum Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 169. 1888.
Coleoptera: imago of *Chauliognathus Pennsylvanicus*. Cullowhee, N.C. [accession no. 4641, designated as type; also 4676, 6212]. Accepted as lectotype for sp., as type sp. for *Eryniopsis* (Mycotaxon 19).

lichenicolus Chondromyces
Bot. Gaz. 17: 402. 1892.
Parasitic on living lichens, which it destroys. New Haven, Ct. [July 1890]. [accession no. 5170].

The type gathering was distributed as number 602 of the Reliquae Farlowianae.

lignatilis Everhartia
Bot. Gaz. 16: 204. 1891.
On wet logs. [West Haven] Connecticut [May 1889]. [without accession no.]

Part of the type collections seems to have been used to assemble no. 833 in the Reliquae Farlowianae.

lonchaeana Muiaria
Bot. Gaz. 58: 244. 1914.
On the abdomen, legs, and antennae of *Lonchaea* sp., no. 2298, Kamerun, West Africa (Schwab). [Oct. 1911] [slide nos. 7207, 7208].

var. *major* Empusa apiculata
Mem. Boston Soc. Nat. Hist. 4(6): 164. 1888.
Coleoptera: imago of *Ptilodactyla serricollis*, Cullowhee, North Carolina [accession no. 4306]. Designated as type.

medusae Muiogone
Bot. Gaz. 69: 9. 1920.
On the under surface of the abdomen of *Chromopteris* sp., Kamerun, W. Africa [slide no. 7236 is labeled type and nos. 7237-7241 seem to be duplicates.]

montana Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 180. 1888.
Diptera: a minute gnat, apparently *Chironomus* sp. Alpine summit of Mt. Washington, N.H. [1886]. [accession no. 4418].

multiplex Endogone
Proc. Amer. Acad. Arts 57: 301. 1922.
Growing beneath the leaf cover beside a path in mixed deciduous woods (oak and hickory) on Cutts Island, Kittery Point, Maine: September 15, 1902. [specimen unnumbered and slides 6265-6268].

muscorum Chondromyces
Bot. Gaz. 37: 411. 1904.
On hepatics on trunks of living beech trees, Crawfordsville, Indiana [Aug. 1897]. [accession number 4522].
This specimen is filed under the name *Chondromyces ligulatus* Thaxter.

myrmecophila Desmidiospora
Bot. Gaz. 16: 203. 1891.
On a large ant. Connecticut [Westville, Sept. 1888]. [accession no. 212].

myrmecophilum Hormiscium
Bot. Gaz. 58: 238. 1914.
On various parts of *Pseudomyrmex* sp., Amazon (Mann). [without accession no.].

nidis-avis Gymnosporangium
Conn. Agr. Exp. Sta. Bull. 107: 6. 1891; Conn. Agr. Exp. Sta. Ann. Rept. 1891: 164. 1891.
On *Juniper* and *Cydonia* and *Amelanchier canadensis*.
Material on both hosts were collected in 1889 by Thaxter in New Haven and in West Haven, Connecticut. They are represented by slide nos. 2204, 3130 and

numerous others unnumbered.

nigromarginata Thaxteriola
Bot. Gaz. 69: 15. 1920.
On the hairs of a minute staphylinid, [Jacobson] no. 2082, Samarang, Java [1910][slide number 9021].

nothofagi Uncinula
Bot. Gaz. 50: 439. 1910.
In foliis *Nothofagi antarcticae* var. *bicrenatae*, *Taphrina* occupatis vel rarius eis in folia sana nigrans. Punta Arenas, Magellanes. Chile. [Feb. 17, 1906]. [accession no. 3896, slides 7033-36].

occidentalis Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 171. 1888.
Hemiptera: aphids on *Betula populifolia*, Maine, Massachusetts.
A collection from Maine 1886 [accession no. 4345] has a type label affixed. In the same year, material from Weston, Mass. and Waltham, Mass. nos. 4347, was also collected.

oedipus Coreomycetopsis
Bot. Gaz. 69: 13. 1920.
On the tips of the legs of *Eutermes morio* var. *St. Luciae*, Grand Etang, Grenada [Dec. 1912]. [Slide nos. 7223, 7224, 7226.]

papillata Empusa
Mem. Boston Soc. Nat. Hist. 4(6): 166. 1888.
Diptera: several minute gnats, Mt. Washington, N.H.; Cullowhee, N.C.
These specimens occur with *Entomophthora conica* Nowakowski.

paradoxa Myrioblepharis
Bot. Gaz. 20: 484. 1895.
On submerged sticks with *Monoblepharis* etc., Weston, Mass. [slide no. 6891].

parasitica Gonatorrhodiella
Bot. Gaz. 16: 202. 1891.
On *Hypocrea* and *Hypomyces*, [West Haven], Connecticut [Oct. 10, 1888]. [accession no. 516, slide no. 2935].

pediculatus Chondromyces
Bot. Gaz. 37: 410. 1904.
On goose dung from Sandy Run, S.C. [Feb. 1904] [accession no. 4525].

phaseoli Phytophthora

Bot. Gaz. 14: 274. 1889.

On pods, stems and leaves of the Lima bean (*Phaseolus lunatus*) New Haven, Connecticut, September and October.

There are several collections which could qualify as type material; also collections were issued in the Reliquae Farlowianae as no. 609.

polymorpha Gonapodya

Bot. Gaz. 20: 481. 1895.

On submerged twigs and other vegetable matter. Vicinity of Cambridge, Mass. and Kittery Point, Maine.

Only the Kittery Point specimen was located [slide 6375].

pulchra Araiospora

Bot. Gaz. 21: 328. 1896.

On submerged sticks in ponds and ditches, vicinity of Cambridge, Mass. and of Kittery Point, Maine.

All the material which is now in the herbarium is from the vicinity of Cambridge. There are two specimens which might be chosen as type: one labeled type from Weston, Mass. (accession no. 47) and another from Arlington, Mass. (no. 49). Slides 5865-78 are labeled type. A later collection from Weston (May 1900) was issued as no. 603 in the Reliquae Farlowianae.

pycnosperma Syncephalis

Bot. Gaz. 24: 11. 1897.

On dung of mice (New Haven, Conn.) and of sheep (Cambridge, Mass.).

Material is in the herbarium which is said to have been collected from old paper (1522). This was labeled type. There are two slides which are marked type and were marked as having been collected on mouse dung.

radiata Endogone

Proc. Amer. Acad. Arts 57: 316. 1922.

Under the leaf cover in spruce woods; Gerrish Island, Kittery Point, Maine; Intervale, N.H.; August 1896 and 1901. In *Sphagnum*, Little Metis, [Provence, Quebec], E. C. Jeffrey.

The Kittery Point collection is labeled type; it is no. 5189 and was made in August 1896. The New Hampshire collection was made in August 1901.

ramosa Blastocladia

Bot. Gaz. 21: 50. 1896.

On submerged twigs, Kittery Point, Maine [slides

5943-45].

repens Muiaria
Bot. Gaz. 58: 245. 1914.
On the wings and abdomen of *Clasiopa* sp. no. 2283, Kamerun, West Africa (Schwab). [Oct. 1911] [slides 7202 and 7204.]

rhizospora Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 183. 1888.
Neuroptera: several genera of Phyrgoneidae (imagines), Kittery, Maine, and North Carolina.
There are a number of specimens from which a type should be selected. These are nos. 4399, 6203, 4403, 6415, 4398, 4402.

rhododendri Hypocreopsis
Proc. Amer. Acad. Arts 57: 429. 1922.
On stems and branches of *Rhododendron maximum.* North Carolina, East Tennessee.
The specimen marked type in the herbarium was collected in Cranberry, N.C., August 1888. Portions of this collection were issued as no. 618 in the Reliquae Farlowianae.

rubescens Myxococcus
Bot. Gaz. 17: 403. 1892.
On various decaying substances, Lichens, paper, dung, etc. [Cambridge] [accession no. 4519].

sarcophilum Helicocephalum
Bot. Gaz. 16: 201. 1891.
On carrion. Connecticut. [Oct. 1888]. [accession no. 464].

scabies Oospora
Ann. Rept. Conn. Agr. Exp. Sta. 1891. p. 159.
"Producing the disease known as "scab" on potato tubers and a similar affliction on beet roots" [accession no. 1064].

septatum Polyangium
Bot. Gaz. 37: 412. 1902.
On horse dung. Cambridge, Mass. [May 1900]. [accession no. 4557].

sepulchralis Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 181. 1888.
Diptera: imagines of Tipulidae. North Carolina, E. Tennessee, Cullowhee, Cranberry, and Burbank.
Lectotypification is perhaps necessary. No. 5090 is

labeled type and is from North Carolina. There are six specimens from the localities listed above which are labeled "authentic."

serpens Chondromyces

Bot. Gaz. 17: 403. 1892.

On decaying lichens, Cambridge, Mass.

Material labeled type and the only material to be found is of a latter collection. There is no verifiable type collection.

sessilis Chondromyces

Bot. Gaz. 37: 411. 1904.

On rotten wood near Miami, Florida [Cocoanut Grove 1897-1899]. [accession no. 4505].

simplex Myxobacter

Bot. Gaz. 17: 405. 1892 (as a nomen nudum).

Bot. Gaz. 18: 29. 1893.

Occurring sometimes with *Myxobacter aureus*, Kittery Point, Me.; Belmont, Mass. [Oct. 1892]. [accession number 4507 and slide no. 4507].

simplex (Thaxter) Thaxter Polyangium

Bot. Gaz. 37: 414. 1904.

≡ *Myxobacter simplex* Thaxter; now known as *Haploangium simplex* (Thaxter) Peterson.

snyderi Termitaria

Bot. Gaz. 69: 8. 1920.

On workers and soldiers of *Reticulitermes flavipes* and *R. virginicus*, Washington, D.C., the former also vicinity of Boston. A specimen of *Rhinotermes marginalis* from Tukeit, British Guiana (N. Banks) [slide no. 7076 is labeled type; it is from Falls Church, Va. The other collections are 7072-7078 from the above locality].

sorediatum Polyangium

Bot. Gaz. 37: 414. 1904.

On rabbit dung from Sandy Run, S.C. [June 1903] [slide nos. 5775-5777, all derived from the same collection].

stipatus Chantransiopsis

Bot. Gaz. 58: 248. 1914.

On the inferior surface of a staphylinid beetle allied to *Tachinus*, no. 1401, Java (Royer). [slide no. 9073].

stipitatus Myxococcus

Bot. Gaz. 23: 408. 1897.

Dung of sheep, pig and other animals. Cambridge, Mass., Kittery Point, Maine; Burbank, Tennessee.

There are several collections with all or part of the above information. They are: 4492 (which is labeled type and is on grouse dung); 4491 which is from Burbank 1897, and 4493 from Kittery Point. There are also several slides, nos. 5747-5749.

strangulatus Rhopalomyces

Bot. Gaz. 16: 21. 1891.

On old bones and other decaying animal matter. Massachusetts, Connecticut. [New Haven, Aug. 11, 1889]. [accession no. 2903].

Material from New Haven, part of the type, was also issued in the Reliquiae Farlowianae no. 851.

tenebrosa Endogone

Proc. Amer. Acad. Arts 57: 314. 1922.

In *Sphagnum*. Little Metis, [Provence Quebec], E. C. Jeffrey. [accession no. 5180].

tenuis Syncephalis

Bot. Gaz. 24: 12. 1897.

On *Sphagnum* in laboratory cultures. Kittery Point, Me. [July 1892]. [accession no. 1491].

termitarius Laboulbeniopsis

Bot. Gaz. 69: 17. 1920.

On tips of legs of *Eutermes morio* var. *St. Luciae*, Grand Etang, Grenada, B.W.I. [No material has been located.]

trispora Blakeslea

Bot. Gaz. 58: 353. 1914.

In cultures of *Botrytis Rileyi* and on larvae, Fawcett, Gainesville, Florida [Oct. 1911]. [accession no. 59].

tropica Cephaliophora

Bot. Gaz. 35: 158. 1903.

On mongoose dung, Kingston, Jamaica; on ass dung, Liberia; on rat dung, Java; on mouse dung, China.

The material from Jamaica [accession no. 307] is labeled type. Three other collections are labeled authentic: Java [accession no. 310]; Liberia [accession nos. 240 and 7300]. Slides 736 and 670 are also present.

variabilis Empusa (Entomophthora)

Mem. Boston Soc. Nat. Hist. 4(6): 183. 1888.

Diptera: minute gnats of various genera, [Cullowhee], North Carolina. [accession no. 4375].

vericillatum Oedocephalum
Bot. Gaz. 16: 18. 1891.
On newts dung. E. Tennessee [1887]. [accession no. 996].

vesiculifera Endogone
Proc. Amer. Acad. Arts 57: 309. 1922.
In *Sphagnum*, Little Metis, [Provence Quebec], E. C. Jeffrey. [accession no. 5178].

virescens Empusa (Entomophthora)
Mem. Boston Soc. Nat. Hist. 4(6): 178. 1888.
Lepidoptera: larvae of *Agrotis fennica*, Ottawa, Ontario (Mr. Fletcher). [slide no. 6588, 6589, 6590-6592].

virescens Myxococcus
Bot. Gaz. 17: 404. 1892.
On hen's and dog's dung, New England. [Maine]. [slide 5754].

Wynneae Syncephalis
Bot. Gaz. 24: 11. 1897.
On *Wynnea macrotis* Berk. [= *W. americana* Thaxter]. Cranberry, N.C. [July 1887]. [accession no. 1511].

xantholini Chantransiopsis
Bot. Gaz. 58: 249. 1914.
On the inferior surface of the thorax of *Xantholinus obsidianus*, Fresh Pond, Cambridge. [Oct. 1902] [accession no. 9071].

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STILBELLACEOUS FUNGI 2. CALOSTILBELLA

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The genus *Calostilbella*, a monotypic genus widely distributed in neotropical regions, was described by von Hoehnel (1919, 1923). The type species, *C. calostilbe* Hoehnel, is reported to be the anamorph of *Nectria striispora* Ellis and Everhart by Samuels (1973) and by Mason (1928), Seaver (1928) and Booth and Holliday (1973), who used the binomial *Calostilbe striispora* (Ell. & Ev.) Seaver for the teleomorph. The anamorphic state was first described and illustrated by Moeller (1901) under the name *Sphaerostilbe longiascus*, a facultative synonym of *N. striispora*. Moeller´s specimen serves as the type of *C. calostilbe*. Mason (1928) provided an historical review of the genus and type species. Moeller (1901), Ashby (1913), von Hoehnel (1923) and Petrak (1959) observed the sterile threads which intermingle with the conidiophores and occasionally exceed them in length. The phialidic nature of the conidiogenous cells was noted by Booth and Holliday (1973) and Samuels (1973). Morris (1963) provided a brief description of *Calostilbella*. However, no mention is made of conidium development and his illustrations do not clearly portray the diagnostic characters of the genes.

Mason (1928) noted that several herbarium names had been applied to the anamorph, *C. calostilbe*. In the *Didymostilbe coccinea* folder at Kew, Mason examined a specimen labelled in Massee´s handwriting, ´ *Hartiella erythrocephala* nov. gen. and sp. No. 1009 . . . W.E. Broadway.´ The specific name *erythrocephala* had been crossed out and ´ *coccinea* ´ substituted by another observer. A second specimen labelled ´ *Hartiella trichocoma* Mass. No. 2282 . . . W.E. Broadway´ was also examined by Mason. Both were found to be conspecific with *C. calostilbe*.

Massee (1910) established the genus *Hartiella* based on *H. coccinea*, the type of which is a J.H. Hart specimen on a cocoa pod shell from Trinidad. He described the conidia of *H. coccinea* as ellipsoid, 1-septate, glabrous, deep red and measuring 7-9 x 4-5 µm. Mason indicated that there was no material at Kew or in Trinidad which corresponded to Massee´s description. We were also unsuccessful in locating the type material of *H. coccinea*. Although specimens No. 1009 and No. 2282 were both collected in 1908 and presumably available to Massee when he established the genus *Hartiella*, they do not correspond to his description of *H. coccinea* and, thus, cannot be used to typify this species. Should the type material of *H. coccinea* be located and found to be cospecific with *C. calostilbe*, then *Hartiella coccinea* would have priority over *Calostilbella calostilbe*.

Von Arx (1981) has shown that *Xenostilbum* Petrak typified by *X. sydowii* Petrak is a facultative synonym of *C. calostilbe*. *Calostilbella* is redescribed and illustrated below.

Calostilbella Hoehnel, Ber. Deutsch. Bot. Ges. 37:160. 1919; Centralbl. Bakteriol., Abt. II, 60:11. 1924.

= *Xenostilbum* Petrak, Sydowia 13: 105. 1959.

Conidiophores macronematous, synnematous. Synnemata erect, straight or somewhat flexuous, white, cylindrical, smooth, terminating in a spherical, rusty-brown head. Filaments of synnemata either fertile or sterile, interwoven, hyaline, septate, monopodial or occasionally dichotomous. Conidiogenous cells enteroblastic phialidic, integrated, terminal, hyaline, smooth-walled, cylindrical to clavate. Phialoconidia acrogenous, 3-septate, with two large, yellow-brown central cells and two small hyaline end cells.

Type species: *C. calostilbe*

Calostilbella calostilbe Hoehnel, Ber. Deutsch. Bot. Ges. 37:160. 1919.

= *Xenostilbum sydowii* Petrak, Sydowia 13(1-6):106. 1959.

Teleomorph: *Nectria striispora* Ellis & Everhart

Mycelium immersed in substrate, composed of branched, septate, hyaline hyphae measuring 2.2-3.0 µm wide. Colonies in culture discrete, cushion-shaped with entire margins, cream-yellow to pink or lemon-yellow to orange, measuring 3.0-3.5 cm diam. in 6 weeks. Conidiophores macronematous, synnematous. Synnemata erect, straight or somewhat flexous, white, cylindrical, smooth, terminating in a spherical, rusty-brown head, 8-10 x 0.4-1.5 mm. Filaments of synnemata either fertile or sterile, interwoven, hyaline, septate, monopodial, occasionally with dichotomous free ends, 146-219 x 2.2 µm. Conidiogenous cells enteroblastic phialidic, integrated, terminal, hyaline, smooth-walled, cylindrical to clavate, (16-) 25-34 x 2.2-4.4 µm. Phialoconidia acrogenous, 3-septate, with two large, yellow-brown central cells and two small, hyaline end cells, (20-)32-55(-62) x (8-)11-13(-16) µm.

Type: As Sphaerostilbe longiascus A. Moeller, auf morschem Holze, Santa Catarian [as St. Cathar.] pr. Blumenau, Brazil, No. 893, (FH!). Note: No fertile heads of anamorph were observed on specimen.

Other Material Examined: As Hartiella coccinea Massee, on dying cocoa tree, Santa Cruz, Trinidad, 20 May 1908, W. E. Broadway, No. 1009, (K!). As Nectria striispora Ellis & Everhart, on unidentified bark, Trail up N. facing slope of Uei-tepui, from old military camp "Ciento Veinticinco", Ca. 118 km s. of El Dorado and Sta. Elena, Edo. Bolivar, Coll. K. P. Dumont et al., 5 August 1972, Dumont-VE6928, (NY!). As Xenostilbum sydowii Petrak, Auf Rinde eines faulenden auf dem Boden liegenden Astes, Hacienda San Antonio bei Banos, Prov. Thungurahuia, Ekuador, 10.XII.1937, Leg. H. Sydow, W14777! W02919!.

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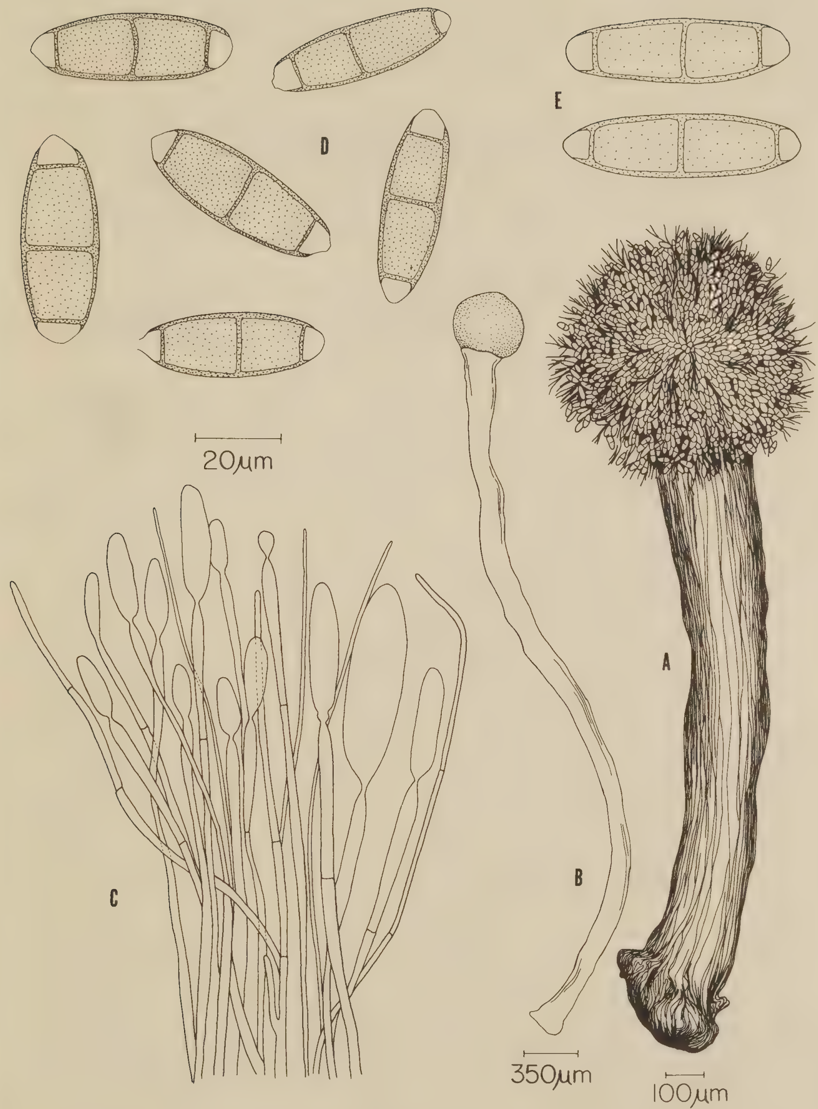
D
E
20µm
A
B
C
350µm
100µm

Figure 1, A-E. Calostilbella calostilbe. A-B. Synnemata. C. Fertile and sterile filaments untermingled. D. Mature conidia from natural substrate. E. Mature conidia from culture.

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CODINAEA COFFEAE AND PHIALOCEPHALA XALAPENSIS, TWO NEW HYPHOMYCETES FROM MEXICO.

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Abstract

In this paper two new species belonging to the genera Codinaea Maire (1937) and Phialocephala Kendrick (1961) are described and illustrated. They have been isolated from nursery soil of Coffea arabica L., in Mexico.

During some mycological investigations on the productivity and management of the coffee agro-ecosystems in Mexico, two Dematiaceous Hyphomycetes, Codinaea coffeae sp. nov. and Phialocephala xalapensis sp. nov. have been isolated from soil; the morphological characteristics in pure culture on soil extract agar are described.

Codinaea coffeae Maggi et Persiani sp. nov.

Coloniae effusae, velutinae atque leviter floccosae in medio, cinereae deinde cineraceo-brunneae; reverso fusco, obscure-brunneo. Mycelium ex hyphis semimmersis vel superficialibus, ramosis, saeptatis, subhyalinis vel brunneis, levibus, 1.8-2.7 µm crassis, compositum. Setae nullae. Conidiophora macronematosa, mononematosa, recta vel leviter flexuosa, vel superne geniculata, simplicia, brunnea, ad apicem versus pallescentia, crasse tunicata, levia, usque ad 9-saeptata, singillatim ex hyphis vel cellulis nodulosis oriunda, usque ad 140 µm longa, 3.2-5.4 µm crassa. Cellulae conidiogenae mono vel polyphialidicae, plerumque 1-2 conidiogenos locos ferentes, integratae terminales deinde intercalares, percurrentes atque sympodialiter elongascentes. Colla definita, caliciformia usque ad infundibuliformia, primo 3.2-4.0 µm lata, 1.5-2.8 µm profunda, dein 4.4-5.4 µm lata, 3.0-5.0 µm profunda. Phialosporae in incoloratum et mucosum capitulum, ad conidiophori apicem congregatae, hyalinae, leves plus minusve allantoideae, convexo latere curviore quam concavo, ad apicem rotundatae, leviter asimmetricae, interdum basi truncatae, 0-saeptatae, 10.8-18.0 x 3.5-5.0 µm, irregulariter guttulata, utrimque setula singula, simplici, recta vel leviter curvata, 4.5-9.0 µm longa, praeditae.

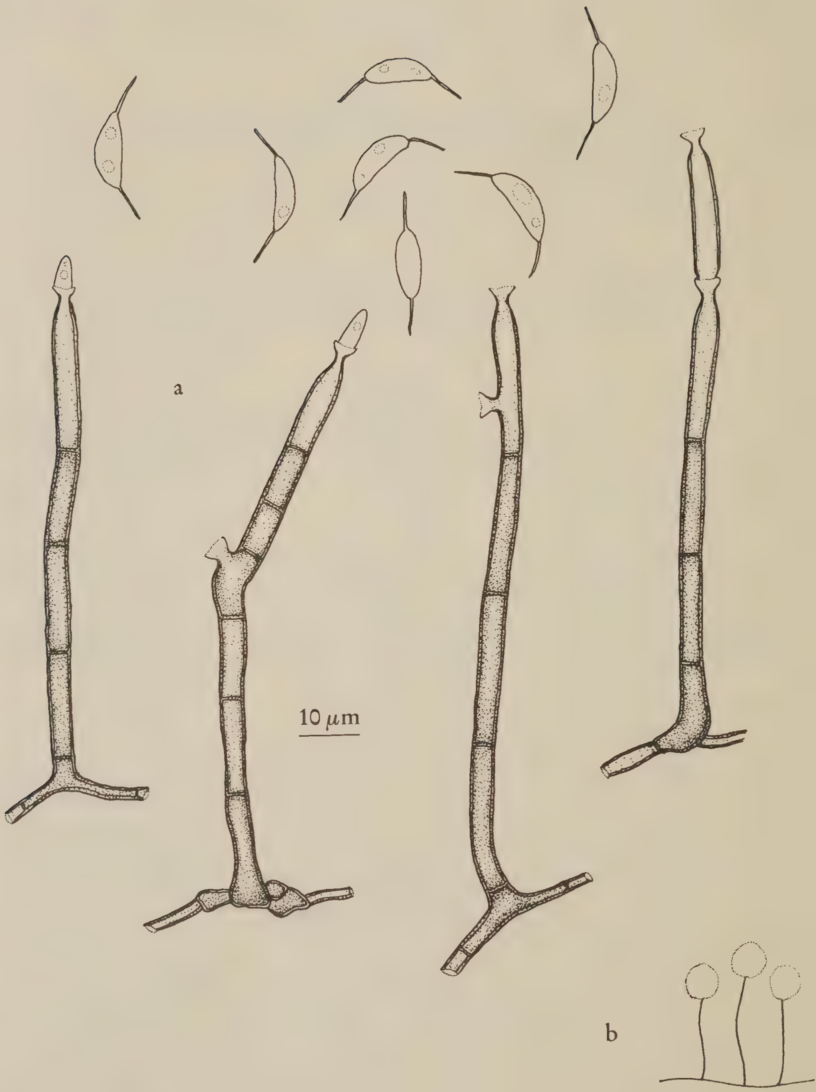

Fig. 1 - *Codinaea coffeae* : a) conidiophores and phialospores; b) habit sketch.

E seminarii solo Coffeae arabicae L., situs coffeiculus Xalapensis, Veracruz, Mexico, 16.5.1983.
Holotypus: H.B.R. 107 S.

Codinaea coffeae Maggi et Persiani sp.nov.

Colonies effuse, velvelty to very slightly floccose in the center, grey to grey-brown; reverse dark, blackish-brown, paler towards the margin. Mycelium composed of semi-immersed or superficial, branched, septate, subhyaline to brown, smooth, hyphae; 1.8-2.7 µm wide; often aggregated to form fascicles. Setae absent. Conidiophores macronematous, mononematous, erect or slightly flexuous, often geniculate in the upper part, unbranched, brown, paler toward the apex, thick-walled, smooth, up to 9-septate, arising singly from the hyphae or from nodulose cells monophialidic or polyphialidic, usually bearing one or two conidiogenous loci, integrated, terminal becoming intercalary, simpodially and percurrently proliferating. Newly formed collarettes well-defined, cup-shaped to funnel shaped, proximally thick-walled, distally thin-walled, 3.2-4.0 µm wide, 1.5-2.8 µm deep, older funnel-shaped and flaring, deeper, 4.4-5.4 µm wide, 3.0-5.0 µm deep. Phialospores accumulated in colourless slimy groups at the apex of the conidiophore, hyaline, smooth, sub-allantoid, with the convex side more curved than concave one, rounded at the apex, slightly asymmetric, sometimes truncate at the base, 0-septate, 10.8-18.0 x 3.4-5.0 µm , irregularly guttulate, with an unbranched, straight or gently curved setula, 4.5-9.0 µm long, at each end.

Following the key to the species of Codinaea Maire (Hewings and Crane, 1981), our strain is related to C. simplex Hughes and Kendrick (1968). It differs from the above mentioned species in the shape and size of phialospores, and in the longer conidiophores, moreover it usually presents percurrent conidiogenous cells. The presence of sympodial and percurrent proliferation is also described for C. heteroderae Morgan-Jones (1982). This species resembles C. coffeae but it differs mainly in the absence of setulae at the ends of the conidia.

Phialocephala xalapensis Persiani et Maggi sp.nov.

Coloniae effusae, atro-brunneae vel atrae, conidiophoris conspicuis, ex substrato oriundis, praeditae; reverso brunneo. Mycelium superficiale et immersum; hyphae saeptatae, ramosae, subhyalinae, 1.8-2.7 µm crassae. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel leviter flexuosa, levia usque ad 700 µm longa, 4.8-5.4 µm crassa, ex stipite et penicilliformi apparatu conidiogeno composita. Stipes 4-7 saeptatus, parietibus crassis, brunneus, ad apicem versus leviter dilutior, basi lobata aut cellula pedali praeditus. Apparatus conidiogenus ex apice stipitis ortus, obconicus, complexus, 30-60 µm longus, 2 saepius 3 ex seriebus metularum compositus, distaliter phialides ferens. Metulae primariae 2-4, parietibus

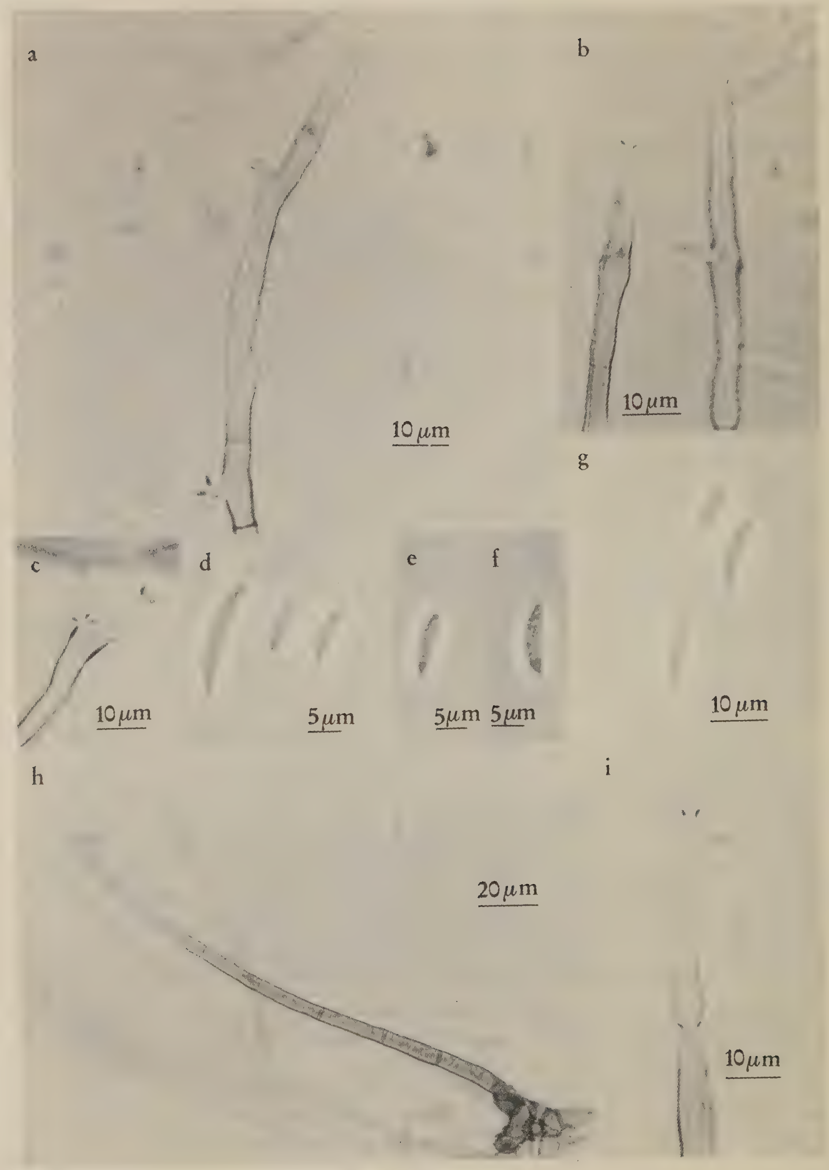
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Fig. 2- *Codinaea coffeae*: a, b, c) phialides and polyphialides with developing phialospores; d, e, f, g) phialospores; h) sympodially proliferating conidiogenous cell; i) percurrently proliferating conidiogenous cell.

crassis, concolores cum mycelio; metula media integrata; 9-16.5 x 3.5-4.0 µm. Metulae secundariae 2-4 in singula metula primaria, parietibus tenuioribus quam primariae; 7.2-9.0 x 2.5-3.0 µm. Metulae tertiariae 2-4 in singula metula secundaria, parietibus tenuibus; 6.0-7.5 x 2.5-3.0. Cellulae conidiogenae enteroblasticae, monophialidicae, discretae, determinatae, sub-cylindricae, parietibus tenuibus, subhyalinae, definito, brevi, constanti collo praeditae; 9.0-12.5 x 1.8-2.2 µm. Stipes a latere ramum, metulis et phialidibus praeditum, rarius fert. Phialosporae in capitulum mucosum ad conidiophori apicem congregatae, oblongae, rotundatae ad apices, crassae ad basim, 0-saeptatae, pallidae brunneae; 3.6-4.0 x 1.8-2.2 µm.

E seminarii solo Coffeae arabicae L., situs coffeiculus Xalapensis Veracruz, Mexico, 16.5.1983.
Holotypus: H.B.R. 108 S

Phialocephala xalapensis Persiani et Maggi sp.nov.

Colonies effuse, dark-brown to blackish, with visible conidiophores arising from substrate; reverse dark-brown. Mycelium superficial; hyphae branched, septate, subhyaline, smooth, 1.8-2.7 µm wide. Conidiophores macronematous, mononematous, solitary, erect, straight or slightly flexuous, smooth, up to 700 µm long, 4.8-5.4 µm wide, consisting of a stipe and a conidiogenous apparatus arranged in a penicillate manner. Stipe 4-7 septate (cell in variable length), thick-walled, brown, paler toward the apex, lobed at the base or with a true foot cell. Conidiogenous apparatus terminal on the stipe, obconical, complex 30-60 µm long, consisting of 2 or more, often 3, series of metulae distally bearing phialides. Primary metulae 2-4, thick-walled, with the same color as the mycelium, with the central one integrated, measuring 9.0-16.5 x 3.5-4.0 µm. Secondary metulae 2-4 on each primary metula, thinner-walled; 7.2-9.0 x 2.5-3.0 µm. Tertiary metulae, 2-4 oneach secondary metula, thinner-walled; 6.0-7.5 x 2.5-3.0 µm. Conidiogenous cells enteroblastic, monophialidic, discrete, determinate, sub-cylindrical, thin-walled, subhyaline with defined short, regular collarettes; 9.0-12.5 x 1.8-2.2 µm. Rarely, the stipe bears a lateral branch, on which metulae and phialides, in the apical apparatus conidiogenous, are inserted. Conidia in slimy masses at the apex of the conidiophore, oblong with rounded apices, thickened at the base, 0-septate, smooth, light-brown, 3.6-4.0 x 1.8-2.2 µm.

Comparing with the type species of the genus Phialocephala, P. dimorphospora Kendrick (1961), our strain is characterized by a similar conidiogenous apparatus and conidiogenesis, but differs in the conidia, which in P. dimorphospora are of two types and in its shorter collarettes. P. xalapensis presents well defined collarettes like those found in P. bactrospora Kendrick (1961), but in this last species they are lengthened and cylindrical, moreover they differ in the number of the series of metulae and in the shape and dimensions of the phialospo-

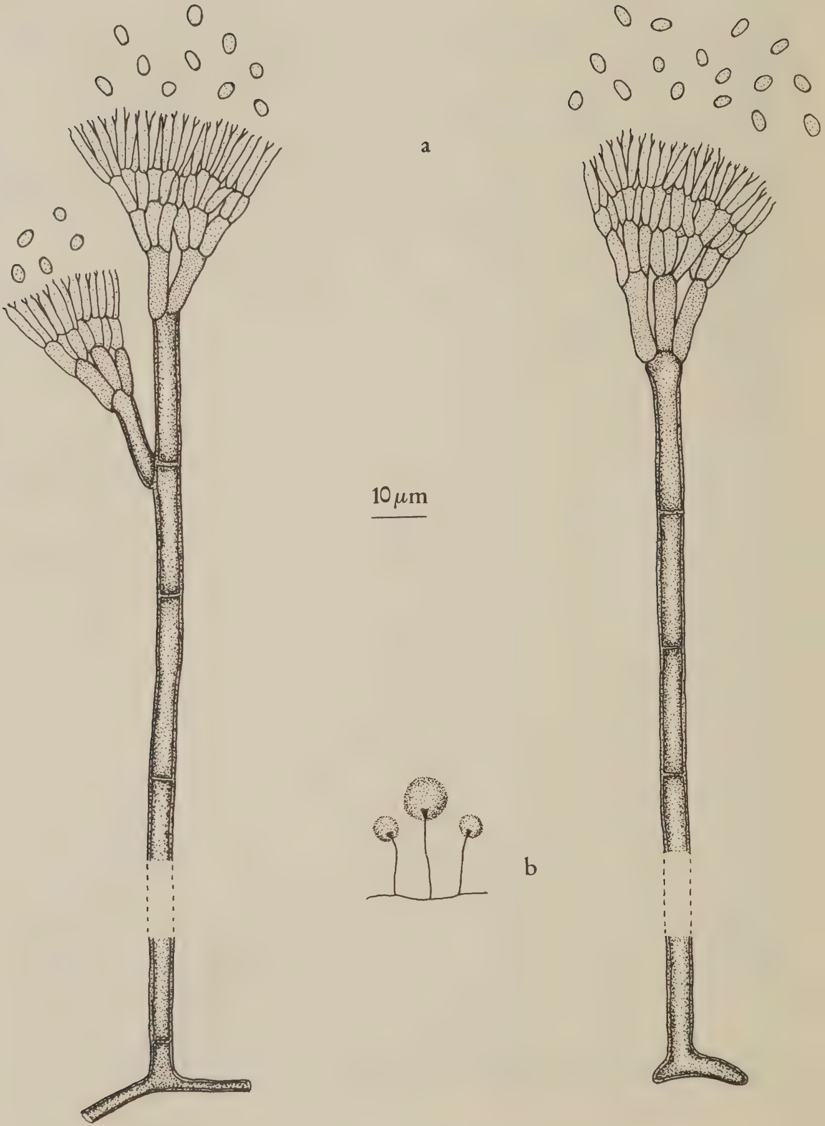

Fig. 3- Phialocephala xalapensis : a) conidiophores and conidia; b) habit sketch.

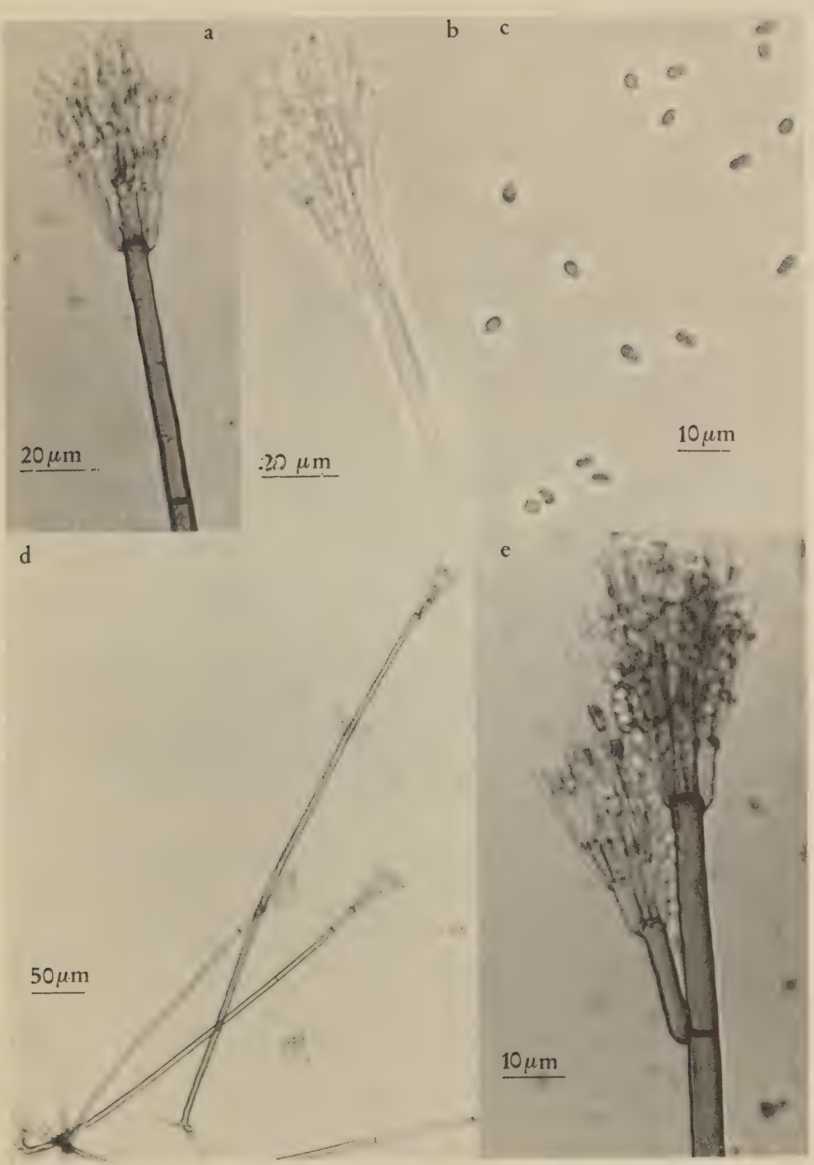
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Fig. 4- Phialocephala xalapensis : a, b) conidiogenous apparatus; c) conidia; d) conidiophores; e) conidiophore with a lateral branch.

res. Our strain also presents some affinities with Phialocephala ivoriensis Zucconi and Onofri (1984) mainly in the general stucture of the conidiophore, but it differs from the last mentioned species for having well-defined collarettes and for the shape and size of conidiogenous cells and phialospores.

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NEW ASELLARIALES (TRICHOMYCETES) FROM THE HINDGUTS OF AQUATIC ISOPODS AND SPRINGTAILS

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ABSTRACT

Two new species of Asellariaceae are described from several sites in the U.S.A.: *Asellaria unguiformis* (from Isopoda) and *Orchesellaria pelta* (from Collembola). *Asellaria aselli*, a European species, is validated, and *Orchesellaria mauguioi*, first described from Europe, is recorded from two new host species in the U.S.A.

The Asellariales reproduce nonsexually by arthrospore-like cells which disarticulate from branched thalli. Sexuality is unknown in the order. Conjugations of branches have been observed in *Asellaria ligiae* Tuzet & Manier ex Manier, but without resulting in the production of zygospores or other sexual cells (Lichtwardt, 1973). The order may be closely related to the Harpellales. This is based on evidence of arthrospore development in *A. ligiae* (Lichtwardt, 1973), and especially on the similarity of the peculiar perforate septa which have been studied by several investigators in many species of Harpellales (see Moss and Young, 1978) and in three species of Asellariales: *A. ligiae* (Manier, 1973), *Orchesellaria mauguioi* Manier ex Manier (Moss, 1975), and *O. podurae* Manier (Manier, 1979).

Asellaria Poisson presently consists of the following species: *A. armadillidii* Tuzet & Manier ex Manier, *A. aselli* Scheer (*nom. nud.*), *A. caulleryi* Poisson (type species), *A. gramenei* Tuzet & Manier ex Manier, and *A. ligiae*. These occur in the hindguts of Isopoda (Crustacea) from terrestrial, freshwater or marine habitats. *Orchesellaria* Manier ex Manier & Lichtwardt species live in the hindguts of springtails (Collembola). The three current species are: *O. lattesi* Manier ex Manier & Lichtwardt (type species), *O. mauguioi*, and *O. podurae*.

In this paper we describe two new species, *Asellaria unguiformis* and *Orchesellaria pelta*, validate *A. aselli*, and extend the host range and geographic distribution of *O. mauguioi*.

Asellaria unguiformis Lichtwardt, sp. nov. Figs. 1-9

Thalli ramosi, ad cuticulam proctodaei Isopodorum aquaticorum affixi a retinaculo complici e cellulis principibus duobus arcuatis unguliformibus 70-120 µm longis ad mucronem attenuatis, utrisque ornatis a serie pectinata prominentiarum brevium irregularium atque excrescentiis accessoriis vel unguliformibus vel bulbiformibus et prominentiis irregularibus. Thallorum ramuli disjuncti ad arthrosporas liberandas ca. 60-100 x 10-20 µm.

Branched thalli attached to hindgut cuticle of aquatic Isopoda by a complex holdfast apparatus consisting of two principal, curved talon-like cell extensions 70-120 µm long and tapered to a point, each with a pectinate series of short irregular projections and with accessory talon-like

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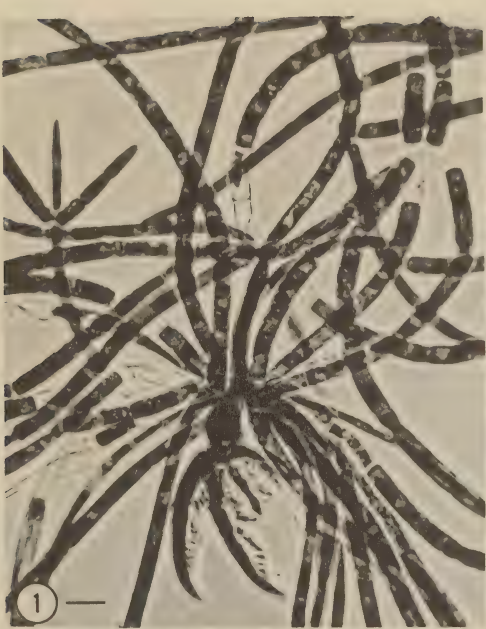
Figs. 1-5. *Asellaria unguiformis*. 1. Part of a large thallus removed from an isopod hindgut, showing the complex basal growth that constitutes the holdfast system. 2. Holdfast apparatus of a young thallus; note the row of outgrowths visible on one of the two principal talon-like prongs. 3. Disarticulating arthrospores. 4 and 5. Loose arthrospores; the angular upper part of the arthrospore in Fig. 4 indicates that it had produced a branch during earlier growth. Figs. 1 and 2 were photographed in lactophenol-cotton blue; the other specimens were living and unstained. All in phase-contrast illumination. Bars = 25 µm; for unmarked photographs use Fig. 3.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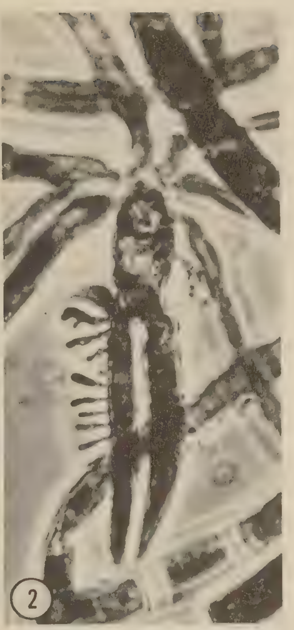
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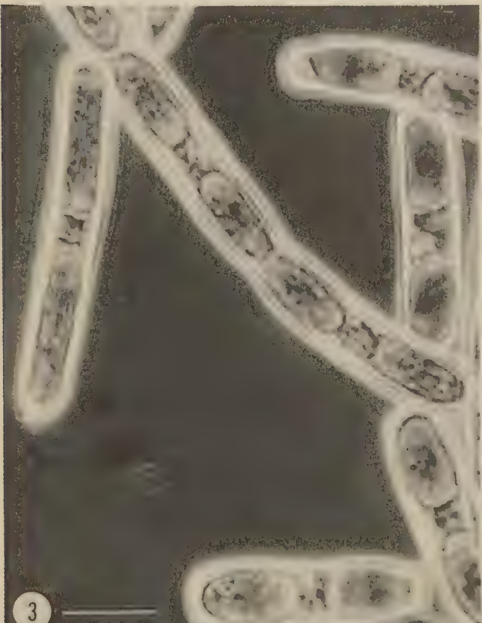
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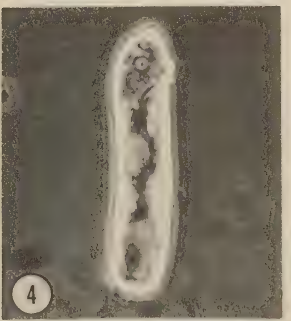
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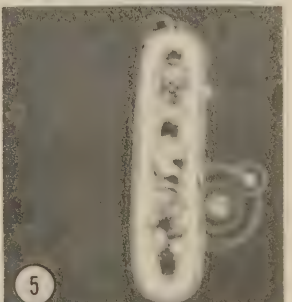
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or bulbous outgrowths with irregular projections. Thallus branches disarticulating to release arthrospores ca. 60-100 x 10-20 µm.

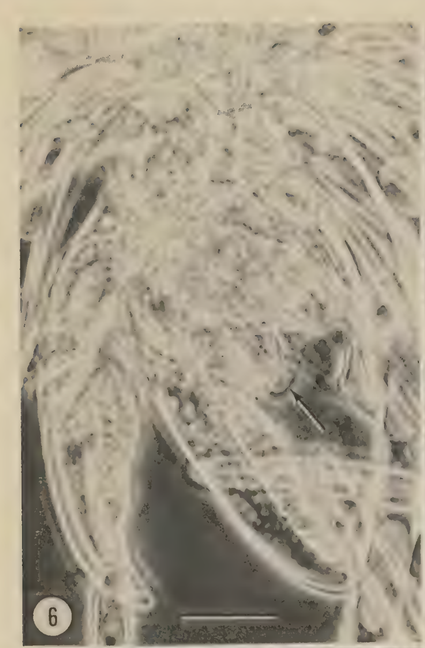
Holotype: Slide ARK-17-2 prepared from hindgut of *Lirceus hoppinae* (Faxon) (Crustacea: Isopoda: Asellidae), deposited with R. W. Lichtwardt, University of Kansas.

Collections: In hindgut of *Lirceus hoppinae* specimens collected (with S. W. Peterson) 7-I-83 in Cobb Creek, 7 km E of junction of state routes 295 and 74, near route 74, behind Cobb Creek Holiness Church, Madison Co., Arkansas, U.S.A. (type locality); and in hindgut of *Caecidotea laticauda* (Williams) (Asellidae) specimen collected (with J. W. Kimbrough and G. L. Benny) 14-V-81 in Little Hatchet Creek, at state route 26, N of Newnans Lake, Alachua Co., Florida, U.S.A.

Species of *Asellaria*, in addition to having different host preferences, are identified primarily by the structure of their holdfast apparatus. That of *A. unguiformis* is considerably more complex than other species, consisting of two large, curved and divergent talon-like prongs with pectinate outgrowths, and various accessory outgrowths and projections from the proximal end of the prongs (Figs. 1, 6-9). Young stages of development (Fig. 2) of the basal cell complex slightly resemble the holdfast cell of *A. aselli*, whose diagnosis and validation follow.

A single, well-infested isopod was collected first in Florida. The holdfast apparatuses of the several mature thalli in that specimen had somewhat more bulbous outgrowths above the talon-like prongs and had shorter pectinate projections (Figs. 8, 9) than did the thalli of the Arkansas specimens (Figs. 6, 7), but these are considered to be variations in the complex holdfast system of the

Figs. 6-9. Holdfast apparatus of *Asellaria unguiformis* thalli showing the two principal talon-like prongs, and auxiliary cells or extensions with a complex assortment of outgrowths (arrows). Figs. 6 and 7 are from an Arkansas isopod, while Figs. 8 and 9 are from a Florida specimen. The holdfast apparatus in Fig. 9 is attached to a wrinkled piece of hindgut cuticle. Fig. 7 was photographed in lactophenol-cotton blue, the others were living material. All in phase-contrast. Bar = 25 µm for all figures.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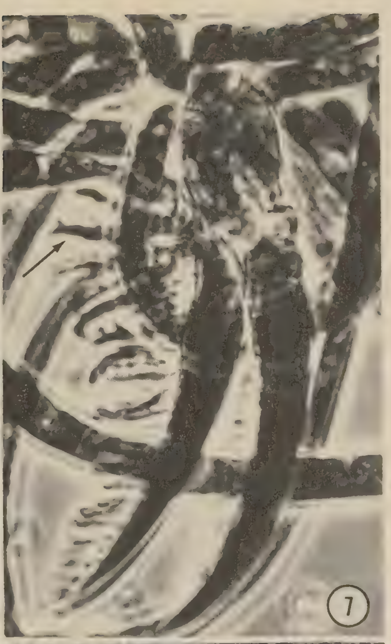
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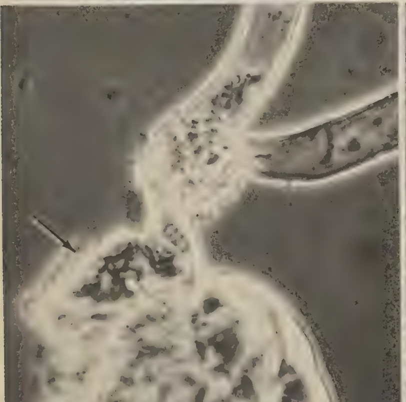
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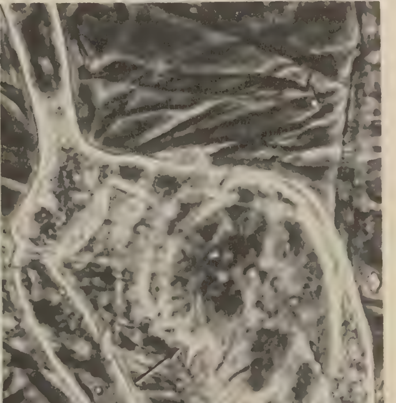
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species. The branches of *A. unguiformis*, like *A. ligiae* (and possibly other *Asellaria* spp.), can break up completely into arthrospores, leaving attached only one or two cells above the holdfast complex while the latter remains attached to the gut cuticle.

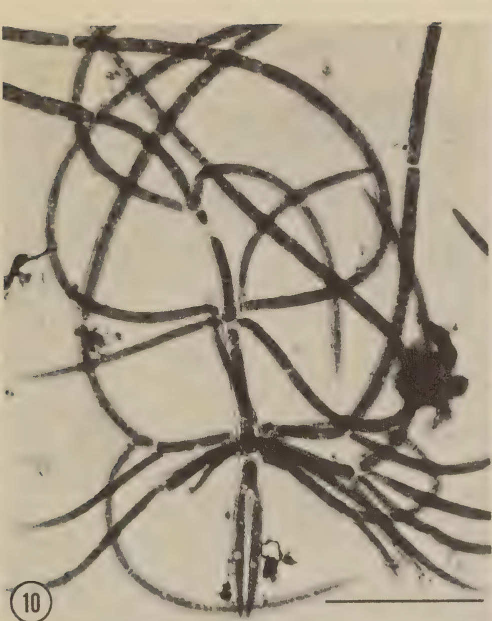
Asellaria aselli Scheer ex Moss & Lichtwardt, sp. nov.
Figs. 10-13

Thalli ramosi usque ad 2.8 mm longitudine, ad proctodaei cuticulam Isopodorum aquaticorum affixi. Cellula basalis retinaculi ad 170 µm longitudine et 37 µm diametro, parte basali majore obovoidea, fissa in dentes binos appressos attenuatos a serie pectinata appendiculorum lateralium brevium vel longiorum (10 µm) ornatos. Arthrosporae plerumque (15-)50-93 µm longitudine, (6-)14-20 µm diametro.

Branched thalli up to 2.8 mm long, attached to hindgut cuticle of aquatic Isopoda. Basal holdfast cell up to 170 µm long by 37 µm diam at its widest part, major lower part obovoid and divided into two appressed tapered prongs, each with pectinate rows of short to long (10 µm), sometimes branched, lateral outgrowths. Arthrospores usually (15-) 50-93 µm long by (6-)14-20 µm diam.

Holotype: Slide BRI-17-7 prepared from the hindgut of *Asellus aquaticus* L. (Crustacea: Isopoda: Asellidae), collected 26-VI-80 in Bystock Fish Pond (SY 034 844) S of East Budleigh Common, Devon, England. *Isotype:* Slide BRI-17-5 prepared from same host specimen as holotype, consisting of thalli and loose arthrospores amongst debris from the gut. Types deposited with R. W. Lichtwardt, University of Kansas.

Figs. 10-13. *Asellaria aselli*. 10. Thallus removed from the hindgut of *Asellus aquaticus* showing the bifurcated basal attachment cell. 11 and 12. Underside (11) and lateral (12) views of bifurcated basal cells showing the pectinate, frequently branched outgrowths. 13. Uninucleate arthrospores prior to disarticulation. Bars = 100 µm for Fig. 10, and 10 µm for Figs. 11-13. Figs. 10 and 13 are lactophenol-cotton blue mounts in bright-field illumination. Figs. 11 and 12 are phase-contrast illumination of living material.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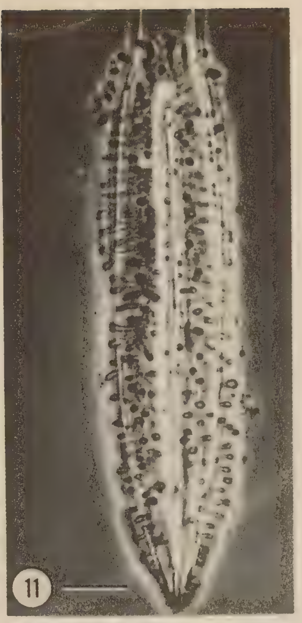
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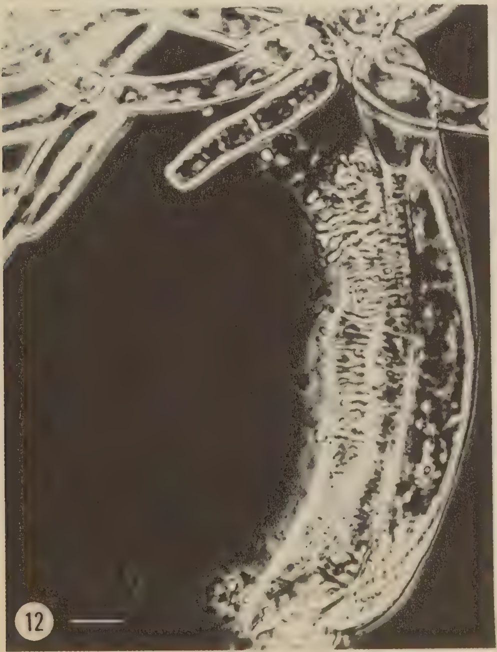
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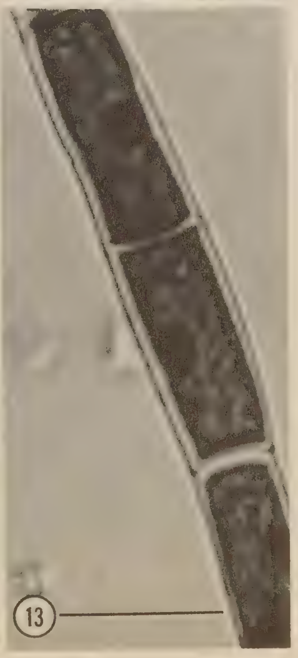
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Collections: All specimens have been found in *Asellus aquaticus*. By Scheer--in many freshwater sites in north-central Europe (Poland, East Germany, West Germany). By Moss and Lichtwardt--in addition to the type locality, in a stream connecting Grasmere and Bridal Water lakes (SD 348 064), 13-VI-80 and 15-VI-80; and in Lake Windermere bay near the Freshwater Biological Association laboratory at Ferry House, in the Lake District, Cumbria, England. By Moss--Wallington River (SU 607 093) N of Portchester, Hampshire, England, 14-V-76, 15-X-76 and 25-VI-80.

The fungus was first collected in 1944 by Scheer near Auschwitz, Poland, and was described under the name *Recticharella aselli* Scheer (*nom. nud.*). Later (1972a, 1972b) Scheer illegitimately transferred the fungus to the genus *Asellaria*. The Latin diagnosis and nomenclatural type citation provided herein validate the name *Asellaria aselli*.

Asellaria aselli lives in isopods from both lotic and lentic habitats. Thalli begin development from an arthrospore which attaches by one end to the hindgut cuticle. The division of the holdfast cell into two prongs occurs early in the development of the young thallus, as described and illustrated by Scheer (1944), and small pectinate series of outgrowths begin to appear on the lower surface of each of the prongs (Figs. 10-12). With phase-contrast microscopy one can see in some specimens what appears to be a mucilaginous secretion around the holdfast cell of both young and mature thalli, presumably to enhance attachment to the substrate.

Orchesellaria pelta Lichtwardt, sp. nov. Figs. 14-22

Thalli ramosi ad 200 μm longi, singillatim vel gregatim ad cuticulam proctodaei Collembolarum a patella pelti-

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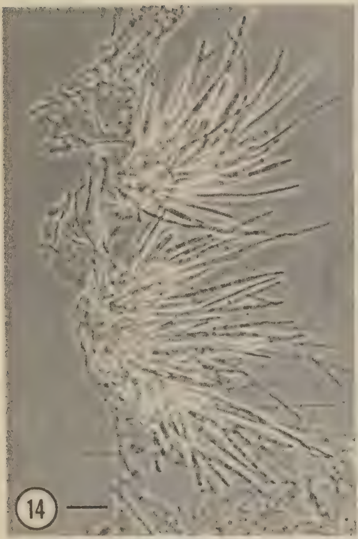
Figs. 14-18. *Orchesellaria pelta*. 14. Tufts of multiple thalli attached to pieces of dissected hindgut cuticle from a springtail. 15-17. Stages of development of individual thalli removed from the cuticle; note the basal shield-like plates in Figs. 16 and 17 which are typical of this species. 18. Young stage, recently attached to hindgut, with a small holdfast. Bars = 25 μm; for unmarked photographs use Fig. 15. Phase-contrast illumination, living material.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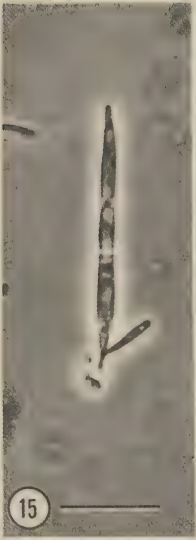
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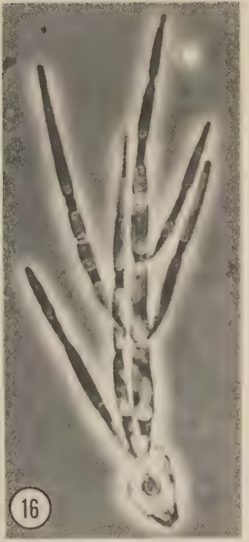
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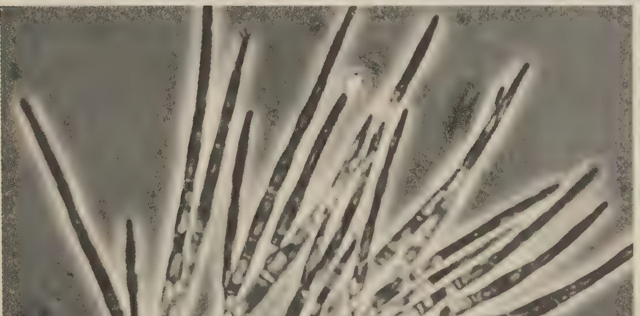
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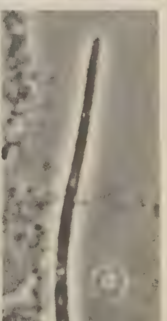
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formi affixi. Rami arthrosporas unicas terminales filiformes 40-60 x 1.2-2.2 µm gignentes.

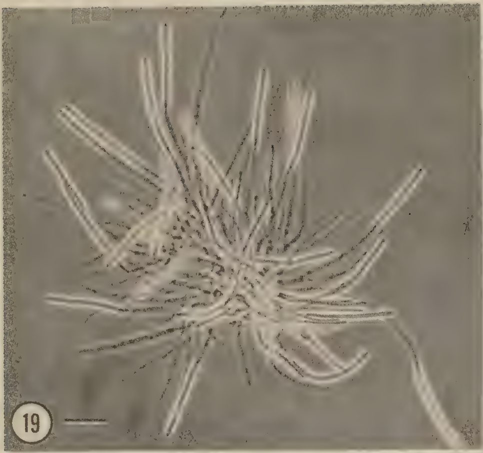
Branched thalli growing singly or in multiple tufts up to 200 µm long, attached to hindgut cuticle of Collembola by a flat shield-like holdfast of irregular shape. Branches 2-6 µm diam, producing terminally single filiform refractive deciduous cells 40-60 x 1.2-2.2 µm.

Holotype: Slide ARK-17-5 prepared from 4 hindguts of *Hydroisotoma schaefferi* (Krausbauer) (Insecta: Collembola: Isotomidae), consisting of attached and loose thalli. (The slide also contains a foreign, finely filamentous fungal colony, possibly originating from the water the host specimens were kept in.) Deposited with R. W. Lichtwardt, University of Kansas.

Collections: In Missouri, U.S.A.: Weaubleau Creek at junction of county road H and U.S. 54, 1.6 km W of Weaubleau, Hickory Co., 13-XI-82; Sac River at route U.S. 160 ca. 1.6 km E of Turnback Creek, Dade Co., 13-XI-82; Sac River at state route 13 ca. 1 km N of Polk Co. line, Polk Co., 16-XII-82. In Arkansas, U.S.A.: Unnamed creek at state route 265 3.7 km S of Hogeye, Washington Co., 6-I-83; Cobb Creek, 7 km E of junction of state routes 295 and 74, near route 74, behind Cobb Creek Holiness Church, Madison Co., 7-I-83 (type locality). All collections were aquatic specimens of *Hydroisotoma schaefferi*.

Individual thalli removed from the gut cuticle have an irregularly shaped, flat shield-like holdfast (Figs. 16, 17). This structure is interpreted as being a secretion from the base of the thallus which cements the thallus to the cuticle. Thalli growing in close proximity form tufts with a common and large shield-like holdfast, and can be removed from the cuticle as a unit. The basal development of thalli is a major distinction among species of *Orchesellaria*; this has been discussed and described by Manier (1979).

Figs. 19-22. *Orchesellaria pelta*. 19 and 20. Thalli with terminal filiform arthrospores. 21. Loose filiform arthrospore. 22. Spherical chlamydospores. Bars = 25 µm; for unmarked photographs use Fig. 21. Phase-contrast illumination, living material.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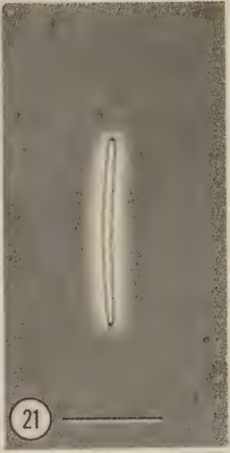
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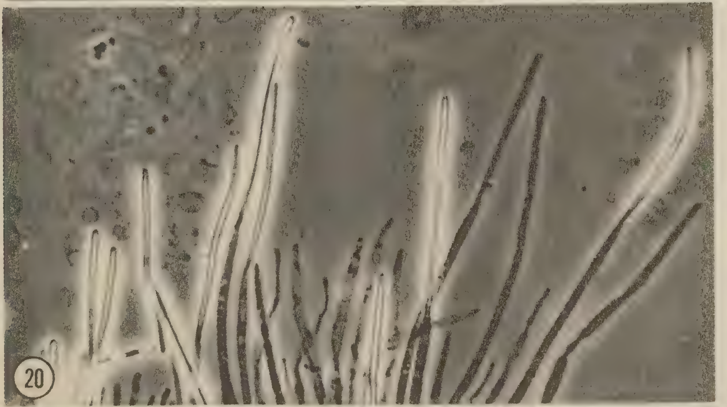
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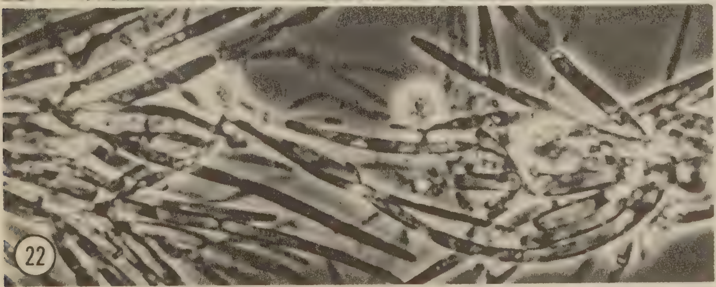
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Other species of *Orchesellaria* produce arthrospores which are undifferentiated cells of the thallial branches. *Orchesellaria pelta* is the only species described so far whose propagule is morphologically distinct from vegetative cells (Figs. 19-21). These specialized cells are produced terminally and singly, and have usually been found on mature thalli whose other cells appear to be degenerated (Figs. 19, 20). No other cells were seen separated from the thalli, though it is conceivable this may occur on occasion.

In thalli from springtails collected at two different sites, round chlamydospore-like cells were observed arising laterally from some of the vegetative cells (Fig. 22). These were structurally similar to, but ontogenetically different from, chlamydospores seen in *O. mauguioi* (Fig. 26). The senior author attempted to culture *O. pelta*, but with no success.

All but a few of the springtails dissected from the collection sites listed had some degree of infestation by *O. pelta*. Interestingly, a stream in Arkansas with the largest population of *H. schaefferi* encountered contained no *O. pelta* in a subsample dissected.

Orchesellaria mauguioi Manier ex Manier Figs. 23-27

A description of *O. mauguioi* was published by Manier in 1964, and validated in her monograph of 1969 (1970). She discovered the species in the hindgut of *Isotomurus palustris* (Müller) (Collembola: Isotomidae) in the department of Hérault, southern France. Moss (1975) described the septal structure of *O. mauguioi* taken from the same species of springtail host which he collected in 1973 from the banks of a stream running through Ravenna Park, Seattle, Washington, U.S.A. *Isotomurus palustris* apparently is a widespread species. In 1980, while doing field work with M. C. Williams in northwestern Montana, U.S.A.,

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Figs. 23-27. *Orchesellaria mauguioi*. 23 and 24. Young and mature thalli, respectively. 25. Loose arthrospore. 26. Spherical chlamydospores. 27. Germinated arthrospores produced in water culture. Bar = 25 μm for all figures. Phase-contrast illumination, living material.

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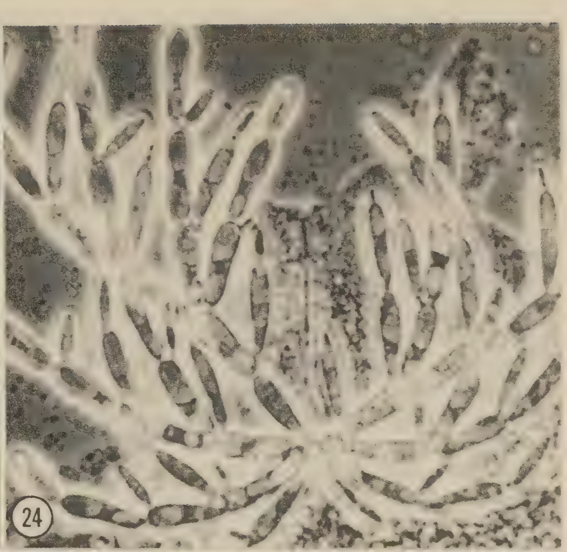

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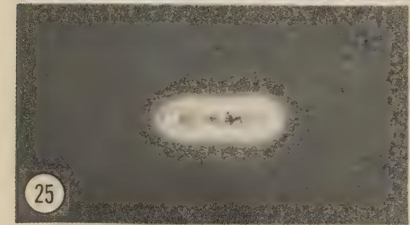

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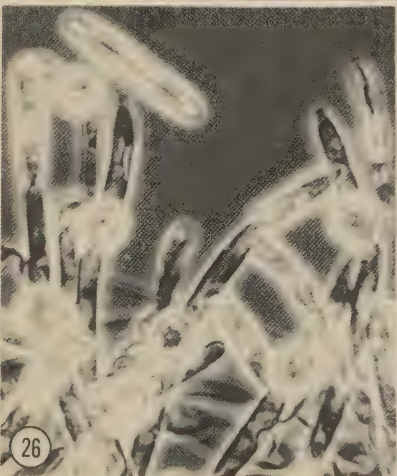

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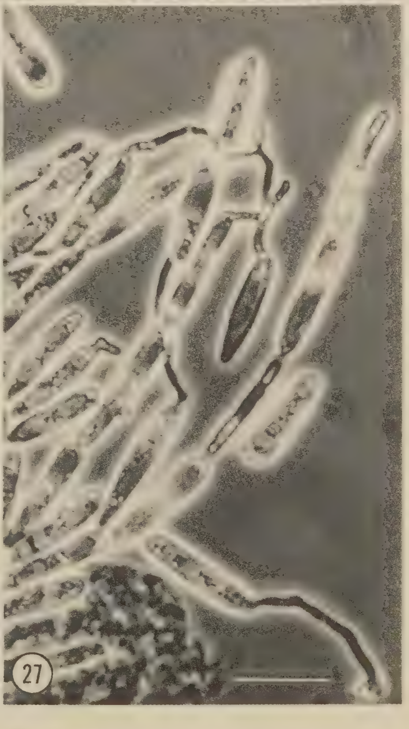

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Lichtwardt found *O. mauguioi* in *I. palustris* and two other genera of springtails. This account records these new hosts and offers some observations on development not yet published.

The previous unrecorded hosts are *Isotoma* sp. and *Agrenia bidenticulata* (Tullberg). All three genera of Collembola with *O. mauguioi* belong to the Isotomidae. *Isotomurus palustris* and *Isotoma* sp. were present in large numbers "skating" on water in a cattail swamp at Finley Point, Flathead Lake, Lake Co., Montana, and were collected 26-VI-82, 3-VII-82 and 15-VII-82. *Agrenia bidenticulata* specimens were found at a higher altitude (1,340 m) adjacent to route U.S. 2 at some step falls in a stream draining from Tranquil Basin, Flathead Co., Montana; they were relatively few and scattered, and were collected mostly under wet rocks on 10-VII-82 and 16-VII-82. It is interesting that both these lotic springtails and the lentic ones from the cattail swamp contained the same gut fungus.

As described by Manier (1964), thalli of *O. mauguioi* commence development from an arthrospore which, after attachment, elongates and then branches prolifically around the base to form a loose radiating thallus attached by a small holdfast (Figs. 23, 24). The elongated original arthrospore persists without branching at the apex of the spore. Most of the cells of the mature branches are narrower at their proximal end, and these cells eventually fall apart to function as arthrospores (Fig. 25). Our material fitted Manier's developmental and morphological descriptions well, except that some of our thallial cells were 1-2 µm wider than the 5-7 µm diam which she indicated.

No Asellariales has been cultured axenically. The senior author was unable to culture *O. mauguioi* on dilute brain-heart infusion and tryptone-glucose, media which have proved successful with a number of species of Harpellales. However, in water culture many of the detached, and even some attached, cells produced long, slender germ tubes (Fig. 27), a form of development which probably does not occur under natural circumstances when cells are exposed to water during passage from host to host. One freshly dissected springtail had many chlamydospores among its branches (Fig. 26). These were mostly intercallary, more rarely terminal. Some intercallary chlamydospores broke away from the thallus with a normal cell retained on each side. No further development ensued, but the presence of chlamydospores in this species and in the previously described *O. pelta* suggests that chlamydospores might be a resistant stage that occasionally forms in these species of *Orchesellaria*.

ACKNOWLEDGMENTS

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MELANCONIS MARGINALIS FROM NORTHERN IDAHO

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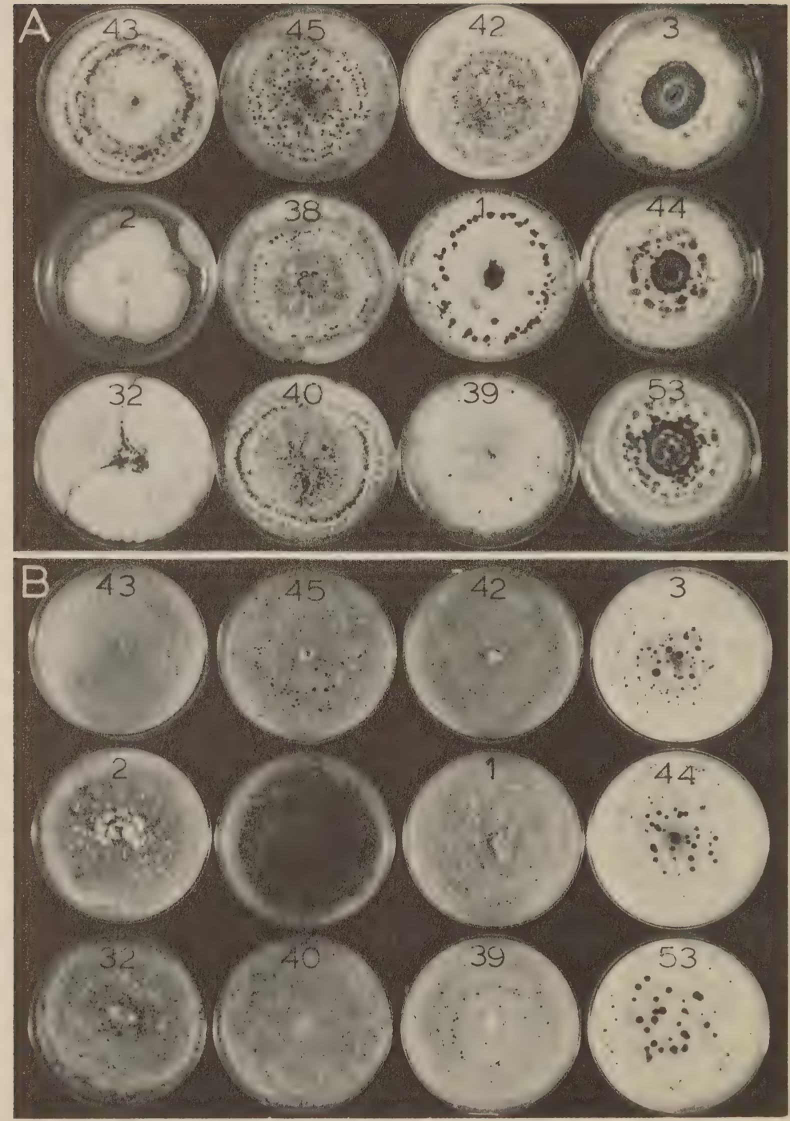
Melanconis marginalis (Peck) Wehmeyer is a common colonizer of Alnus tenuifolia Nutt. in northern Idaho. During the past four years M. marginalis has been collected in northern Idaho at Big Meadow Creek (BMC), Latah Co.; Laird Park (LP), Latah Co., 20 mi. N.E. of BMC; and Deception Creek (DC), Kootenai Co., 60 mi. N. of LP. The collections from these locations generally agree with the species description but the spores and asci are somewhat larger. Some specimens (normal-spored) have ascospores 17-24 µm long, which mostly fall within the described limits of 13-22 µm. Others (large-spored) have ascospores of 19-30 µm which are exceptionally long for this species. In view of these variations, a study was undertaken to determine the relationships of these northern Idaho populations to each other and to other populations.

Cultures from massed ascospores were grown at ca. 21°C under 12 h/da fluorescent light on Difco potato dextrose agar (PDA); Difco malt agar (MA); and half-strength Difco oatmeal agar (OM/2, 36 g oatmeal agar, 7.5 g agar/L H_2O). Four isolations were made from each collection in order to assess intraspecimen variation.

Cultures from individual collections were generally identical and in only two collections was one of the four isolates atypical in having darkened, appressed mycelium. However, cultural morphology varied considerably among different collections (Fig. 1A). Collection site could not be correlated with variation, but cultures were separable into two groups that coincided with ascospore size.


A
43
45
42
3
2
38
1
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32
40
39
53
B
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42
3
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32
40
39
53

Fig. 1. Cultures of Melanconis marginalis. A. On MA. Right column shows large-spored isolates. B. On OM/2. Right column shows large-spored isolates.

Cultures from normal-spored collections were similar on OM/2 (Fig. 1B) and, although they varied on PDA and MA, had several characters in common. They produced conidia in slimy black masses from relatively restricted, sporodochium-like areas. Growth rate varied among them, but most grew an average of about 3.8 mm/da on PDA. All of these cultures produced varying amounts of a straw- to caramel-colored pigment that diffused into the agar. The pigment was water-soluble and extracts from the cultures, when proportionally diluted, appeared identical, indicating that they consisted of the same substance.

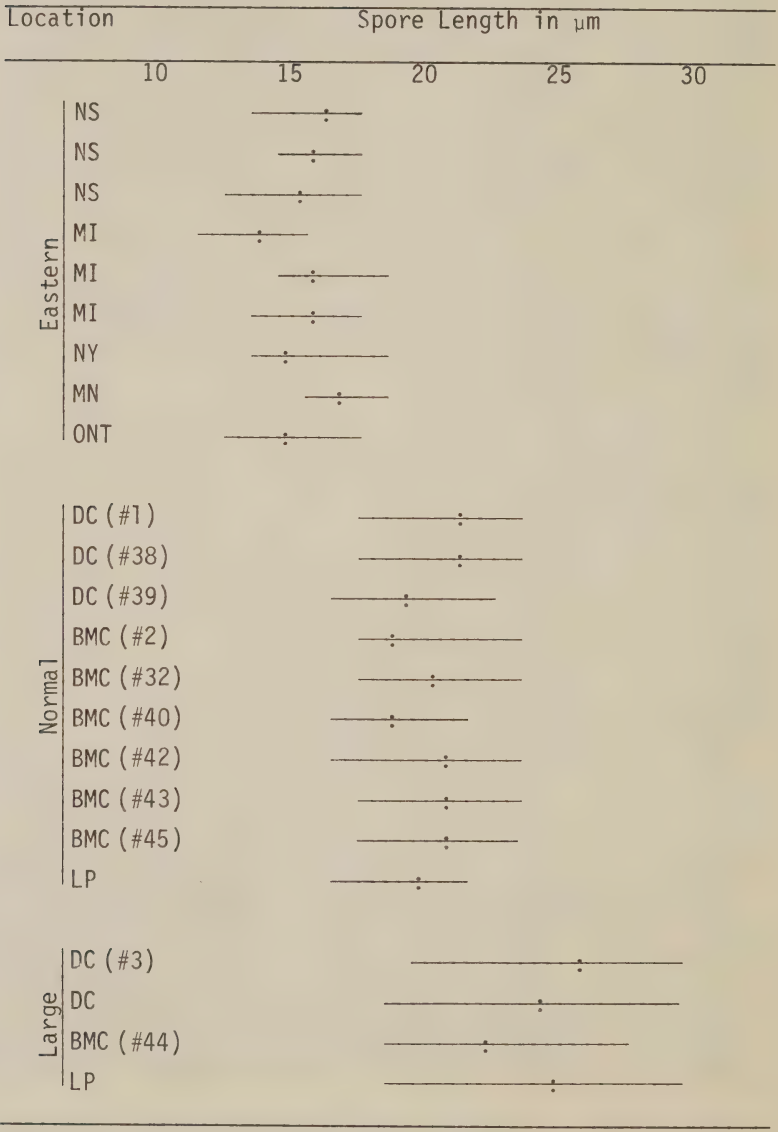
Melanconium anamorphs of Melanconis have two types of conidia: α spores which are ovoid to fusoid and pigmented; and β spores which are cylindrical-elongate and hyaline. Wehmeyer (2) cultured M. marginalis on twigs of Tilia and obtained both spore types, but the normal-spored cultures of this study produced only α conidia regardless of the type of medium.

Cultures from the large-spored collections were similar on PDA, MA, and OM/2 and distinct from the normal-spored cultures (Fig. 1A, B). They differed from the normal-spored isolates in several ways. Conidia were produced in spreading, dry, dark green areas rather than discrete slimy ones. Growth rate on PDA was constant at ca. 2.2 mm/da, which was substantially slower than the normal-spored isolates. They did not produce any pigment and, most importantly, produced both α and β conidia. Based on the data summarized in Tables 1 and 2, there appear to be two separate but closely related populations of M. marginalis in northern Idaho.

Table 1. Cultural characters of normal and large spored collections of Melanconis marginalis

Normal		Large-spored
Faster growing	:	Slower growing
Slimy sporulation	:	Dry sporulation
Pigment production	:	No pigment
α spores only	:	Both α and β spores

Table 2. Ascospore lengths of various collections of *Melanconis marginalis*



[a] Colons represent mean length.

Peck (1) described Diaporthe marginalis as having ascospores 20.5-23 μm long. When Wehmeyer transferred D. marginalis to Melanconis (2), he gave the ascospore length as 15-18(20) μm. He (3) later reduced M. marginalis to a variety of M. alni Tul., M. alni var. marginalis (Wehmeyer) Wehmeyer, and reported ascospores as 13-22 μm. Since even the normal-spored collections from northern Idaho have ascospores longer than this (17-24 μm), Peck's type collection and those in Wehmeyer's herbarium were examined.

There are six of Wehmeyer's specimens, three from Nova Scotia (NS) and three from Michigan (MI). The type collection is from New York (NY). Two other specimens from eastern North America were seen, one from Ontario (ONT) and one from Minnesota (MN). As a group these eastern collections were very similar. They had ascospores 13-19 μm in length, a range substantially shorter than either group from northern Idaho (Table 2).

Based on ascospore data alone, there appear to be at least three groups in M. marginalis, one from eastern North America and two from Idaho. To give each group formal nomenclatural status on the basis of data from one character would introduce considerable ambiguity, since the groups overlap in ascospore size. Should cultural data become available for populations in eastern North America and support the separation of these groups, erection of new taxa might be warranted. Meanwhile, the species description is emended to encompass the western populations.

Melanconis marginalis (Peck) Wehm. emend.

Stromata in bark, pustulate, 1.5-2.5 mm diam, with erumpent white to tan pulverulent ectostromatic disc in center, 0.5-1.0 mm diam. Perithecia circinate-valsoid with convergent necks, the ostioles protruding slightly, encircling the ectostromatic disc. Perithecia 350-800 μm diam; perithecial necks 0.5-1.0 mm long. Peridial cells mostly angular, 8-15 μm diam. Asci cylindric to fusoid, 55-115 X 8-15 μm, with a prominent apical ring, becoming detached from the hymenium. Ascospores hyaline, fusoid, two-celled, constricted at the median septum, (13)15-24(30) X 4-8 μm, with blunt, tapered appendages at each end, 3-8 X 2-3 μm. Conidia of two types from annellophores, α spores fusoid, translucent grey-green, black in mass, 9-17 X 3-7 μm, β spores hyaline, cylindric-elongate, 10-18 X 2-3 μm.

Melanconis marginalis looks like M. alni and has the same host, facts that led Wehmeyer to combine them (3).

Observations have been made on three specimens of *M. alni*, two from Austria and one from Germany. These have ascospores 16-22 µm long, slightly larger than collections from eastern North America, a fact that Wehmeyer noted (3). However, the α conidia of *M. alni* are brown and ovoid, very different from the greenish, fusoid conidia of *M. marginalis*. Since *M. alni* is basically a European species and has distinct conidia, it should be treated as a separate species and *Melanconis marginalis* should also be maintained as a species.

Specimens examined

Melanconis marginalis. IDAHO: Jensen, J. D., no. 82-136 (culture 2), no. 82-133 (culture 32), 26.V.1982, no. 82-218 (culture 40), 16.X.1982, no. 83-107 (culture 42), no. 83-103 (culture 43), no. 83-109 (culture 44), no. 83-113 (culture 45), 15.IV.1983, Big Meadow Creek Park, Latah Co., on *Alnus tenuifolia* Nutt.; Glawe, D. A. and M. MacKenzie, no. 80-218, 17.X.1980, Laird Park, Latah Co., on *Alnus tenuifolia*; Glawe, D. A., no. 79-145, 4.VII.1981, Laird Park, Latah Co., on *Alnus tenuifolia* Nutt.; Jensen, J. D. and B. C. Callan, no. 83-202 (culture 53), 14.IX.1983, Laird Park, Latah Co., on *Alnus tenuifolia* Nutt., (only *Melanconium* present); Jensen, J. D., J. D. Rogers and D. A. Glawe, no. 80-202 (culture 1), no. 201 (culture 3), no. 80-204, 10.IX.1980, Deception Creek, Kootenai Co., on *Alnus tenuifolia* Nutt; Jensen, J. D., no. 82-225 (culture 38), no. 82-226 (culture 39), 15.X.1982, Deception Creek, Kootenai Co., on *Alnus tenuifolia* Nutt. MICHIGAN: Brown, C. A., det. L. E. Wehmeyer, no. FP 599, 20.VIII.1930, Angleworm Lake, Isle Royale, on *Alnus crispa* Pursh. (MICH); Povah, A. H., det. L. E. Wehmeyer, no. FP 135, no. FP 109, Rock Harbor, Isle Royale, on *Alnus crispa* Pursh., (MICH). MINNESOTA: Glawe, D. A., X.1978, St. Louis Co. NEW YORK: Peck, C. H., V.1885, Elizabethtown, Essex Co., on *Alnus viridis* DC. (NYS, Type). NOVA SCOTIA: Wehmeyer, L. E., no. 1660, 24.VI.1935, Mt. Uniacke, (MICH); Wehmeyer, L. E., no. 1607, 3.VIII.1933, Portapique Beach, Colchester Co., on *Alnus* sp., (MICH); Wehmeyer, L. E., no. 277, 5.IX.1929, Oldham, Halifax Co., on *Alnus* sp., (MICH). ONTARIO: Cain, R. F., 19.VI.1963, Thunder Bay, on *Alnus* sp., (WSP 41301, as *M. alni* var. *marginata*).

Melanconis alni. AUSTRIA: Rehm, H., 1907, Brenner, on *Alnus viridis* DC., (MICH); Baumgartner, J., det. F. Petrak, VI.1939, Hartberg, on *Alnus viridis* DC., (WSP

18467). GERMANY: Starcs, K., det. A. Ludwig, 16.VIII.1946, Hersbruck, on *Alnus incana* (L.) Moench, (WSP 15080).

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3. __________. 1941. *Revision of Melanconis, Pseudovalsa, Prosthecium, and Titania*. *Univ. Mich. Std. Sci. Ser.* 14: 1-161.

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NEW SPECIES OR INTERESTING RECORDS OF FOLIICOLOUS LICHENS

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SUMMARY

Enterographa bartlettii sp. nov. is described from New Zealand. Considerable range extensions are noted for *Arthonia cyanea, Asterothyrium decipiens, Bacidia aurantiaca, B. carnea, B. micrommata, B. scutellifera, Catillaria mirabilis, Enterographa multiseptata, Mazosia rubropunctata, Opegrapha filicina, Porina pseudofulvella, Tapellaria bilimbioides, T. nana* and *T. nigrata.*

This paper is part of continuing world-wide research on the taxonomy and the distribution of foliicolous lichens. A new species is described from New Zealand and interesting data on the taxonomy of several species and considerable range extensions for others are presented.

Arthonia cyanea Müll. Arg.

Rwanda, Gikungu, ± 30 km N of Rutsiro, env. 2100 m, ± disturbed montane forest, on leaves of *Strombosia scheffleri,* 1974, *J.L. De Sloover* in *J. Lambinon* 74/577 (LG, herb. Vězda).

This collection matches well the lectotype of *Arthonia cyanea* (Brazil, Bahia, *Kalkmann*, G !). However a few differences with the accurate description of the species provided by Santesson (1952 : 78) may be noted for the African collection : apothecia slightly smaller (0.2-0.4 mm in diam.) and spores 2-3-septate (measurements : 14.5-18.5 x 4.5-6.0 µm; average : 16.5-5.4 µm). The species was previously known from tropical America, the Phillipines and the Moluccas Islands. It is new for Africa.

Asterothyrium decipiens (Rehm) R. Sant.

U.S.A., Florida, Apalachiola National Forest, along Sopchoppy River, hardwood forest, 1976, *Sérusiaux* 1792 (LG).

This is the first record of *Asterothyrium decipiens* in the continental United States. This species, as well as *Tapellaria bilimbioides, T. nana, Bacidia aurantiaca* (see under these species), *Aulaxina quadrangula* (Stirton) R. Sant., *Echinoplaca pellicula* (Müll. Arg.) R. Sant., *Porina nitidula* Müll. Arg. and *Trichothelium epiphyllum* Müll. Arg. (Tucker 1979; Tucker & Harris 1980) must be added to the list of foliicolous lichens from the continental United States provided by Sérusiaux (1979a) (1).

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(1) There is little doubt that more foliicolous lichen species occur in S-E United States, especially in Louisiana and Florida. Amongst the collections preserved at FH and amongst those sent to me by Dr. S.C. Tucker, there are at least one new species of *Catillaria* (s.l.) and a confusing species close to *Bacidia apiahica* (Müll. Arg.) Zahlbr. Their

Bacidia aurantiaca Vězda

U.S.A., Florida, Sanford, on palmetto leaves, 1915, *Rapp* (two collections; FH, LG).

Bacidia aurantiaca was described by Vězda (1974) from two collections made in Guinea/Africa (coll. *Lisowski* n° 1248, holotypus in herb. Vězda !), and was later reported from the province of Haut-Zaïre in Zaïre (Vězda 1980). This is the first record of the species from the New World.
In the American collections, the thallus is 3-7 mm in diam., rather granulose, continuous, rarely dispersed, greenish. Apothecia abundant, circular, 0.3-0.4 mm diam., constricted at base; margin at first rather thick but soon thin and non prominent, orange pale to almost white; disc at first plane but becoming distinctly convex, bright orange to reddish brown. Excipulum typically paraplectenchymatous, ± 30 µm thick in the outer parts, not more than 20 µm thick under the hypothecium, K+ red, except in the outest parts; hypothecium hyaline, K+ red; hymenium hyaline, 50-70 µm thick. Paraphyses abundant, branched and anastomosed, 1 µm thick, not thickened at their apices. Asci clavate, 8-spored; spores ellipsoid, 3-septate, sometimes with a further oblique septum, constricted at the septa, halonate, 12-15 x 4-5 µm. This species is easily distinguished by its hypothecium and excipulum that turn red with KOH. No other foliicolous *Bacidia* species with a paraplectenchymatous excipulum, an orange disc and 3-septate halonate spores show that reaction.

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identification requires the revision of the corticolous species belonging to both *Catillaria* and *Bacidia*, mainly the *B. molybitis-phacodes* aggr., in North America. Tucker (1979) reports *Lopadium fuscum* Müll. Arg. as foliicolous in Louisiana. The only specimen (LSU !) is *L. puiggarii*, following the recent circumscription of those species (Sérusiaux 1979a).

Bacidia carnea Vězda

Trinidad, Maraval Valley, 1913, *Thaxter* (FH).

Bacidia carnea was described by Vězda (1975a) on a single collection from Guinea/Africa (coll. *Lisowski* 1359, holotypus in herb. Vězda !). This is the second published record of that species.
A short description of the Trinidad specimen follows. Thallus circular, to 5 mm diam., minutely farinose, continuous, rarely ± dispersed, bluish white to bluish. Apothecia ± abundant, circular, 0.2-0.3 mm diam., constricted at base; margin at first thick, prominent, pale orange, very minutely pruinose, then becoming thinner and less pruinose; disc plane, flesh-colored. Excipulum typically paraplectenchymatous, 25 µm thick in the outer parts, ± 35 µm thick under the hypothecium; K-, hypothecium pale brown, ± 25 µm thick, K-; hymenium hyaline, 45-60 µm thick. Paraphyses abundant, sinuous, branched and anastomosing, 2 µm thick, not thickened at apices, forming a rather gelatinous mass. Asci clavate, with a ± thick wall, 8-spored. Spores ellipsoid, 3-septate, constricted at their septa, halonate, 14-19 x 4-5 µm. Typical features of this species are the farinose bluish thallus, the apothecia with a thick and prominent margin, the gelatinous paraphyses which are branched, anastomosing and 2 µm thick. This collection was identified as *Bacidia subternella* (Nyl.) R. Sant. by R. Santesson in 1954. This latter species has however apothecia with a thin and not prominent margin, simple 1 µm thick paraphyses, and smaller spores (10 x 15 x 2.5-4.5 µm).

Bacidia micrommata (Krempelh.) R. Sant.

Zaïre, Wangata (N 00°01'; E 18°14'), *Staner* L 458 (LG).

This species was first mentioned in Africa by Vězda (1980) from two collections in the province of Haut-Zaïre. This report suggests a much wider distribution in the equatorial rain forest of the Zaïre basin. It was formerly known from Indonesia and the Phillipines (Santesson 1952).

Bacidia scutellifera Vězda Fig. 1-5

Costa Rica, Puntaneras Prov., Las Cruces Tropical Botanical Garden (5-6 km SSE of San Vito), 1400 m, premontane rain forest, on leaves of palmetto, 1979, *T. Nash III* (LG).

This collection, although rather scanty, is nevertheless very typical : the shape of the thallus glomerules, the scutelliform isidia as well as apothecia and ascospores all confirm its identity. The species was formerly known from Africa (West-Guinea, Tanzania, Zaïre and Zimbabwe) and from Asia (West Malaysia and India) (Vězda 1975b, 1980; Sérusiaux 1983). It is new for the New World.

Catillaria mirabilis Vězda Fig. 6-7

Zaïre/Shaba (formerly Katanga), Plateau des Muhila, ravin de la rivière Laula, 1972, *Malaisse* 2026e, 2030e, 2032, 2042e & 2056e (all in LG).

In the southern parts of Shaba in Zaïre, foliicolous lichens and liverworts are rare and confined to dense dry evergreen forests, riparian forests, and to forests in deep ravines. The Laula ravine on the lower slopes of the Mts Muhila (SSE of Kansimba) is a quite exceptional site, being a deep gorge about 40 m wide with a permanent stream, lying between 1230 and 1450 m elevation. Its flora is both afromontane and guineo-congolian with many relictual elements. Seventeen species of foliicolous liverworts were recorded from that ravine by Vanden Berghen (1972) and my own studies show twenty-seven species of foliicolous lichens : *Arthonia trilocularis* Müll. Arg., *Aulaxina quadrangula* (Stirton) Müll. Arg., *Bacidia rhapidophylli* (Rehm) Zahlbr., *B.*

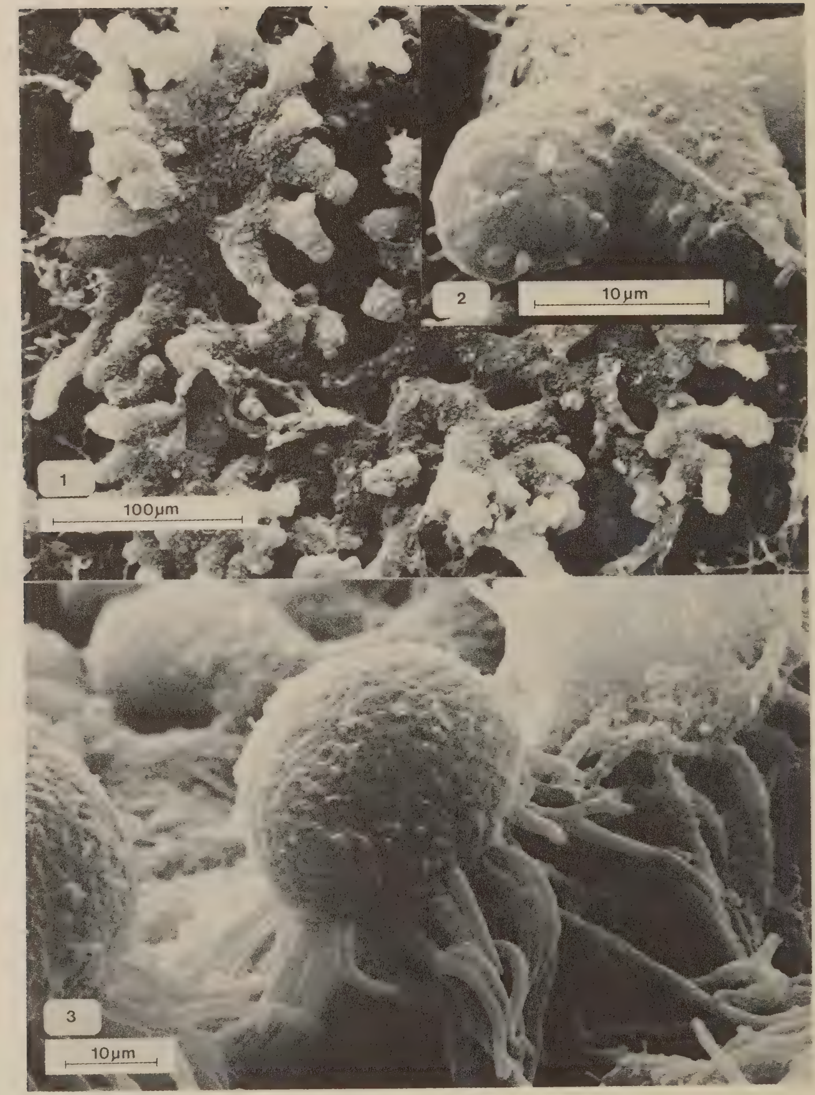

Fig. 1-3. *Bacidia scutellifera* Vězda (Zaïre, Kivu, *Lambinon* 72/20, LG). 1 : Upper view of the thallus glomerules; 2 : detail of the thallus margin. Note the bacteria growing on the surface; 3 : young isidium.

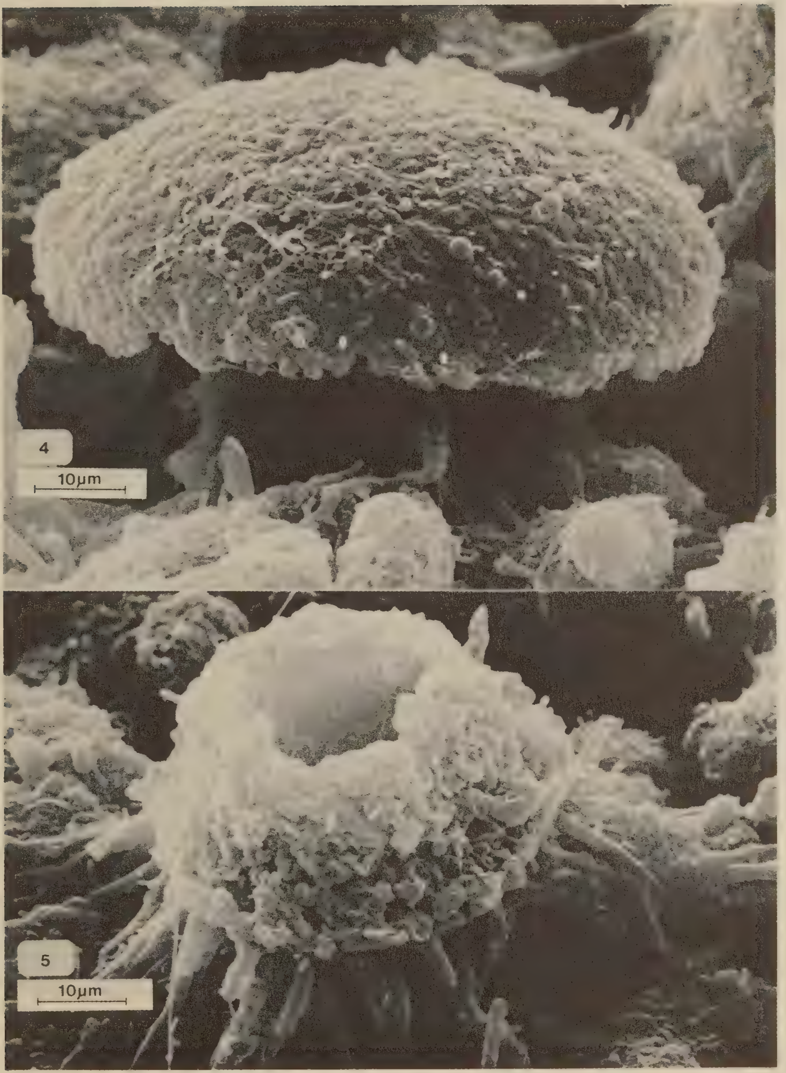

Fig. 4-5. *Bacidia scutellifera* Vězda (Tanzania, *Pócs* 6438 - ISOTYPUS, LG). 4 : almost ripe isidium; 5 : cupula left on the thallus after isidium ejection.

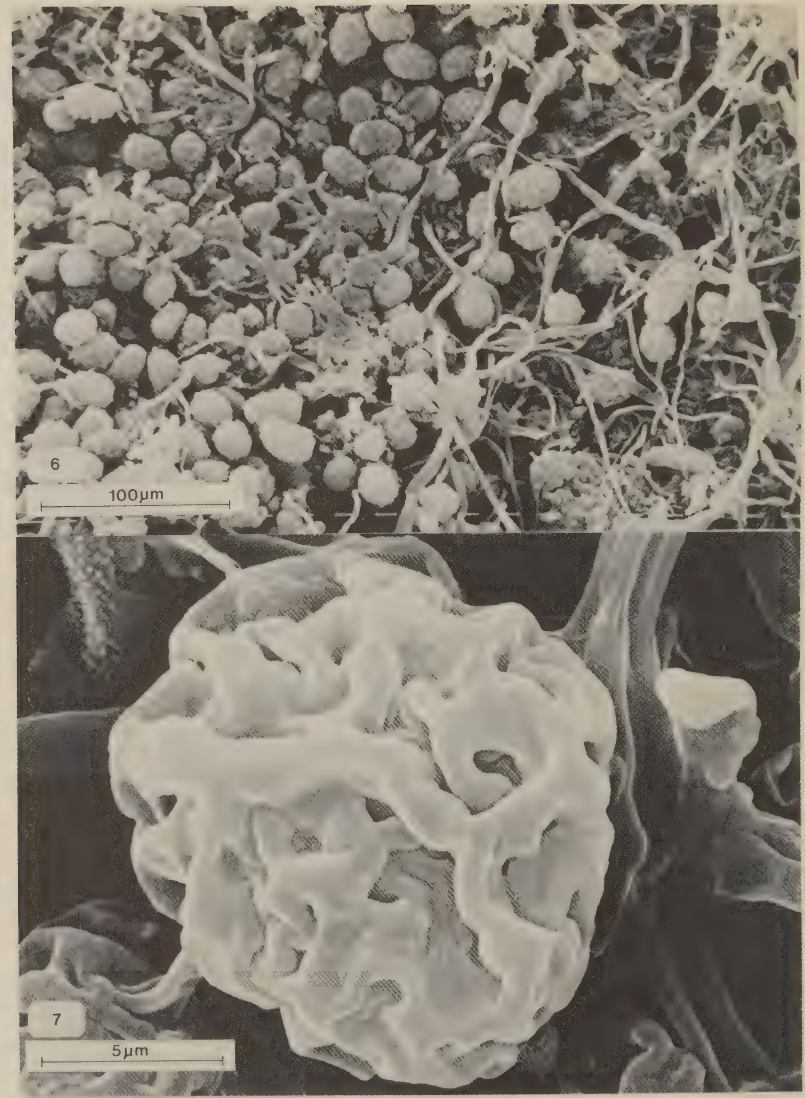

Fig. 6-7. *Catillaria mirabilis* Vězda. 6 : Zaïre, Haut-Zaïre, *Lisowski* 44380 (LG). View of the thallus, exclusively made of goniocystes; the long hyphae belong to an unknown dematiaceous hyphomycete assumed to be a saprophyte; 7 : Zaïre, Kivu, *Lambinon* 78/265. Detail view of a goniocyste (material not brought to the critical point).

sublecanorina (Müll. Arg.) Zahlbr., *Byssoloma leucoblepharum* (Nyl.) Vainio, *Calenia conspersa* (Stirton) R. Sant., *Catillaria mirabilis, Dimerella epiphylla* (Müll. Arg.) Malme, *D. fallaciosa* (Müll. Arg.) Vězda (2), *Gyalectidium rotuliforme* Müll. Arg., *Gyalidea epiphylla* Vězda, *Mazosia melanophthalma* (Müll. Arg.) R. Sant., *M. rotula* (Mont.) Massal., *Opegrapha filicina* Mont., *Porina atrocoerulea* Müll. Arg., *P. limbulata* (Krempelh.) Vainio, *P. nitidula* Müll. Arg., *P. phyllogena* Müll. Arg., *P. epiphylloides* Vězda, *P. epiphylla* (Fée) Fée, *Raciborskiella janeirensis* (Müll.Arg.) R. Sant., *Strigula elegans* (Fée) Müll. Arg., *S. melanobapha* (Krempelh.) R. Sant., *S. nitidula* Mont., *S. schizospora* R. Sant., *S. subtilissima* (Fée) Müll. Arg. and *Tapellaria phyllophila* (Stirton) R. Sant.

Catillaria mirabilis, described by Vězda in 1980, is a taxon of uncertain generic position. It does not belong to *Catillaria* as circumscribed by Kilias (1981) : the excipulum is paraplectenchymatous, the paraphyses are thick (reaching 2.5 μm in diam.), simple and straight and the asci are not of the lecanoralean-type. A new genus may be necessary to accomodate this species. The thallus of *C. mirabilis* is composed of small (15-30 μm) glomerules containing an algae colony tightly wrapped up by a layer of entangled hyphae. These glomerules are named ganiocystes and obviously act as diaspores (see Sérusiaux 1984). The species is not uncommon in the

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(2) *Patellaria fallaciosa* Müll. Arg. was reduced to synonymy with *Dimerella lutea* (Dickson) Trevisan by Santesson (1952). A. Vězda recently recognized its identity and will soon publish a more detailed account of its diagnostic characters. The species grows a well developed algiferous thallus on the upper side of the leaf, connected over the leaf margin with a free mycelium on the under side. Apothecia are usually located on the free mycelium near the leaf margin. The species is present in Brazil and is known also from three provinces of Zaïre : Kivu, oriental prov. and Shaba.

dense rain forest of the Zaïre basin and must be regarded as guineo-congolian in affinity.

Enterographa bartlettii Sérusiaux species nova
Fig. 8-10

Thallus usque ad 5 mm diam., constatus e numerosis parvis areolis, nunquam continuum thallum formantibus, protothallo nullo; areolae circulares vel elongatae, usque ad 0.4-0.6 mm longae, unaquaeque cum unico ascocarpio, viridi-albae vel caesii-albae. Ascocarpia lirellina, irregulariter flexuosa, simplicia, interdum 2-3 ramulis aucta, valde prominentia, 0.3-0.4 mm longa, 130-160 μm lata et 110-130 μm alta; discus angustatus, planus vel ± convexus, aurantiaco-brunneus margine thallino fere albo. Textura excipuloidea angustissima incolorataque. Hymenium 50-65 μm altum, hypothecium 10 μm altum, sub hypothecio stratum ex hyphis laxe intricatis hyalinisque formatum. Paraphysoides ramosae anastomosantesque, 0.8-1.0 μm crassae; asci ellipsoidei, pariete crasso, 8-spori. Sporae fusiformes, 7-septatae, microcephalae, 18-21 x 4-5 μm,halo distincto, 2 μm crasso. Alga ad *Phycopeltem* pertinens.

Typus : New Zealand, Waitakere Range near Auckland, epiphyllous on *Griselinia lucida*, 1979, *J.K. Bartlett* 18599 (LG-holotypus; BM, CHR-isotypi).

Thallus up to 5 mm across, usually smaller, comprising several small and numerous patches, never forming a continuous thallus but occasionnally confluent, hypothallus absent; patches circular or elongate, 0.4-0.6 mm diam., each bearing an ascocarp, greenish white to bluish white, surface smooth or slightly irregular, scarcely or rarely nitidous. Ascocarps abundant, linear, irregularly bent or undulate, simple,sometimes bifid or trifid, strongly prominent, 0.3-0.4 mm long, 130-160 μm wide and 110-130 μm high; side surface smooth or slightly irregular, almost white; disc linear, flat or somewhat convex, orange brown or sometimes almost red.

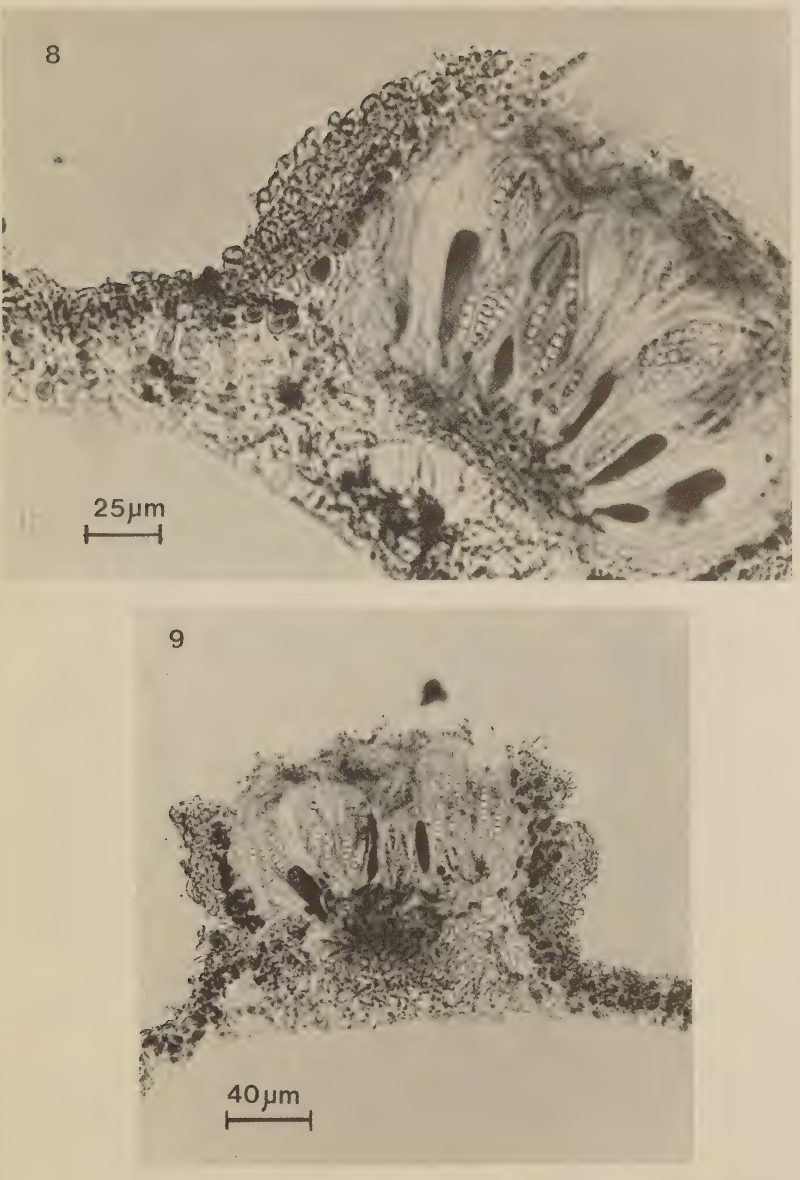

Fig. 8-9. *Enterographa bartlettii* Sérusiaux, HOLOTYPUS. Cross sections through apothecia, stained with lactophenol cotton-blue.

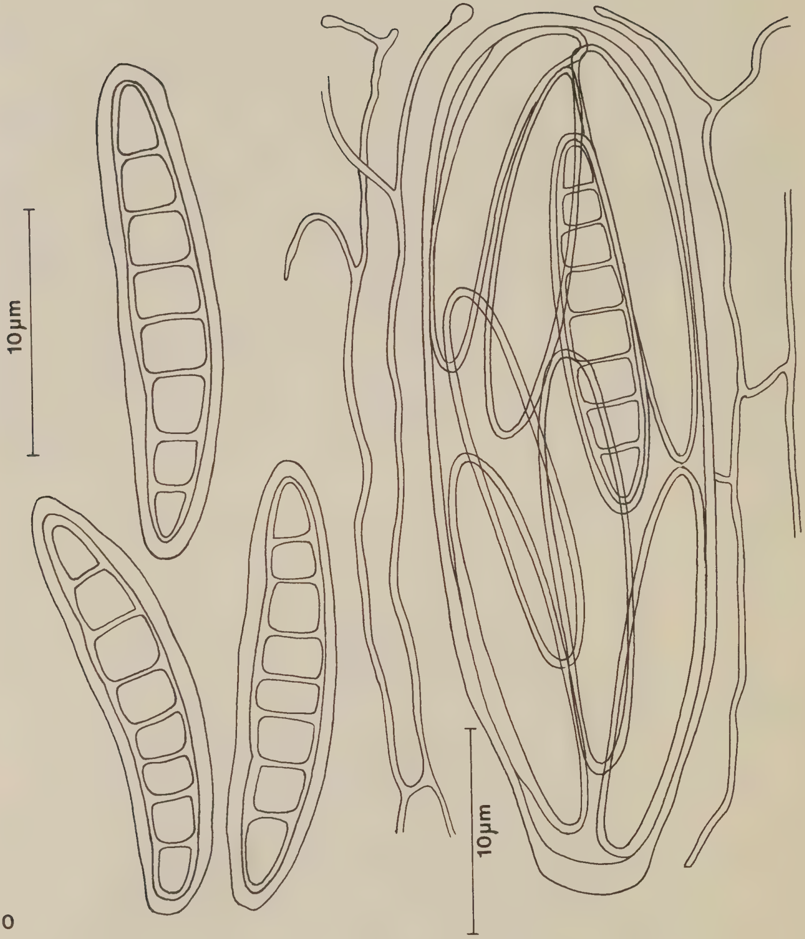

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Fig. 10. *Enterographa bartlettii* Sérusiaux, HOLOTYPUS. Spores and hymenium.

Excipuloid tissue very thin, not exceeding 5-8 µm thick, hyaline, formed of a network of coherent hyphae, covered by the algiferous thallus, e.g. the layer of algae (5-10 µm thick) and a ± pseudoparenchymatous layer pale brown in section, containing a few crystals. Hymenium 50-65 µm high, hyaline; epithecium 5 µm thick, pale brown; hypothecium 10 µm high, hyaline or very pale brown; layer of very loosely interwoven hyphae present between the hypothecium and the leaf surface, hyaline. Paraphysoids abundant, especially within the epithecium, thin (0.8-1.0 µm thick), branched and anastomosed; asci ellipsoid, thick-walled, 8-spored. Spores fusiform, straight or slightly curved, slightly but distinctly inflated centrally, 7-septate, non constricted at the septa, 18-21 x 4-5 µm, with a 2 µm thick halo. Phycobiont : a species of *Phycopeltis* (Trentepohliaceae), cells rounded or angular, oblong or ± rectangular, 6-9 x 3-5 µm, forming a continuous plate but without any regular radiate row of cells.

Enterographa bartlettii grows on the same leaves as *E. bella*, a species described by Santesson (1952) also from New Zealand. The latter is rather common there, being abundant in several collections sent to me by J.K. Bartlett, but so far it is not known from any other part of the world.
The following table illustrates differences between *E. bartlettii* and the other two foliicolous species of *Enterographa* with hyaline hypothecium and underlying layer.

Enterographa multiseptata R. Sant. Fig. 11

Seychelles Islands (Indian Ocean), La Digue, ± 100 m elevation, open forest, on leaves of cinnamon-tree, 1983, *J.L. De Sloover* (LG).

This collection appears to be almost identical with *Enterographa multiseptata*, a bambusicolous species described by R. Santesson in 1952 and formerly known only from the type-collection in Sri Lanka

	E. bartlettii Sérusiaux	*E. bella* R. Sant.	*E. effusa* Vězda
Thallus color	greenish white to bluish white	green to greenish grey	ash grey to grey green
Ascocarps size			
length	0.3-0.4 mm	0.5-0.8(-1.0) mm	0.3-1.3 mm
width	± 0.15 mm	0.15-0.2 mm	0.5 mm
height	0.1-0.15 mm	less than 0.1 mm	0.2 mm
Spore size	18-21 x 4-5 µm halo : 2 µm	22-29 x 4-5 µm halo : 3-4 µm	25-30 x 3-3.5 µm halo : 1.5 µm
Phycobiont	not forming radiate rows of cells	forming very regular radiate rows of cells	forming ± distinct radiate rows of cells

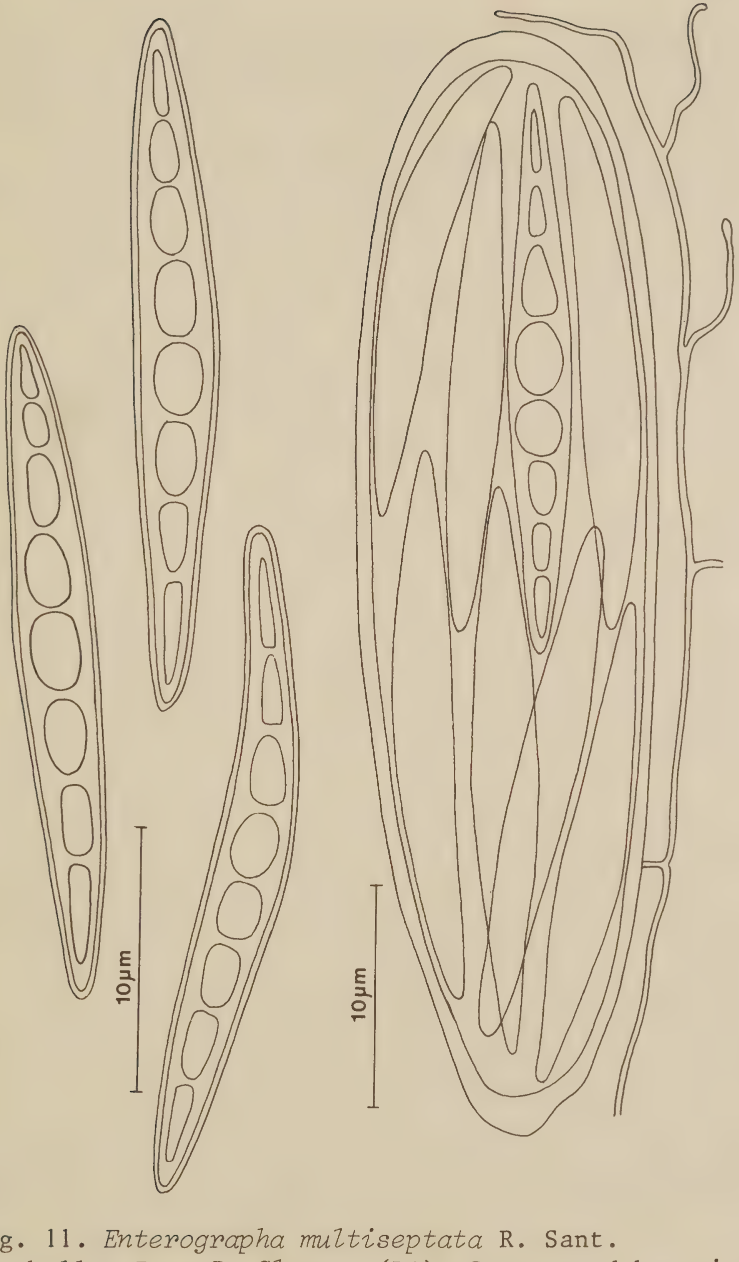

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Fig. 11. *Enterographa multiseptata* R. Sant. Seychelles Is., *De Sloover* (LG). Spores and hymenium.

(Ceylon). It differs however in the septation of the spores (in the type, they are 7-14-septate whilst they are here consistently 7-septate) and in the presence of a halo. For the time being, I consider these two discrepancies as too small to separate two taxa. A description of the collection from the Seychelles follows.

Thallus ± circular, 3-5 mm in diam., continuous in the central parts but comprising numerous small patches near the edge (the thallus first appears as small circular patches that become confluent and form a single thallus), greyish white to green white, surface smooth or slightly irregular, ± nitidous, hypothallus absent, ascocarps linear, irregularly bent or undulate, rarely simple, usually branched (3-6 branches), sometimes stellate, not or hardly prominent, 0.6-0.8(-1.0) mm long, 180-200 µm wide and 110-130 µm high, side surface smooth; disc linear, rather convex and ± prominent, brown to dark brown.

Excipuloid tissue very thin, not exceeding 5 µm thick, sometimes totally inconspicuous, hyaline, formed of a few interwoven hyphae, covered by the algiferous thallus, which contains numerous angular crystals and which is usually quite disorganized at that level. Hymenium ± 60 µm high, hyaline; epithecium 5-8 µm high, pale brown to brown; hypothecium inconspicuous; layer of densely interwoven hyphae between the hymenium and the leaf surface very distinct, dark brown, K-. Paraphysoids abundant, especially in the epithecium, thin (0.8-1.0 µm thick), branched and anastomosed. Asci ellipsoid, thick-walled, 8-spored. Spores narrowly fusiform, with ± acute ends, 7-septate, not constricted at septa, but distintly locular, (26-)27-29(-30) x 3-4 µm, plus a thin (less than 0.5 µm) halo. Phycobiont : a species of *Phycopeltis* or *Trentepohlia* (Trentepohliaceae), cells rounded or angular, oblong to ± rectangular, 6-8 x 4-5 µm, forming neither regular radiate rows of cells nor a continuous plate.

Mazosia rubropunctata R. Sant.

Zaïre, Wangata (N 00°01'; E 18°14'), *Staner* L 458 (LG).

This species was first mentioned in Africa by Vězda (1973) from one collection in Guinea. Known also from South America (Santesson 1952).

Opegrapha filicina Mont. Fig. 12-13

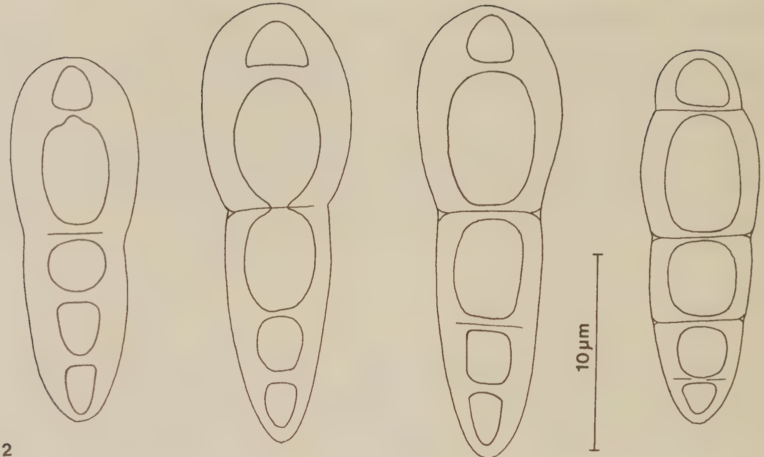
New Guinea, Madang Prov., rain forest, between Awar Plantation and Boroi (S 4°06'; E 144°48'), at sea level, foliicolous on palm tree, 1980, *Demoulin* 5952 & *Smeets* (LG).

I have hesitated to assign this plentiful collection to *Opegrapha filicina* Mont. As a matter of fact, in this collection, the pycnidia produce two different types of conidia, a feature I have never seen in the several collections of *O. filicina* studied from South America and Africa. This criterium however is not constant as a few pycnidia were observed with crescent-shaped conidia only. The collections available are so far too few to get a good idea of such a variation.

In typical collections of *O. filicina* and in this one, spore ontogeny is worthy of some attention : the five loculae are formed quite early in the spores by internal differential thickening of the wall and constriction of the lumen. A complete septum (= affecting the entire spore wall) eventually appears.

It is very distinct in the collection from New Guinea and represents the weakest point of the spore : the two parts easily break apart at that point.

Two to three further septa appear later in the New Guinean collection but were very rarely seen in specimens from other parts of the world. *O. filicina* is known from the New World, Africa and India (Santesson 1952; Awasthi & Singh 1973). A description of the New Guinean collection follows.



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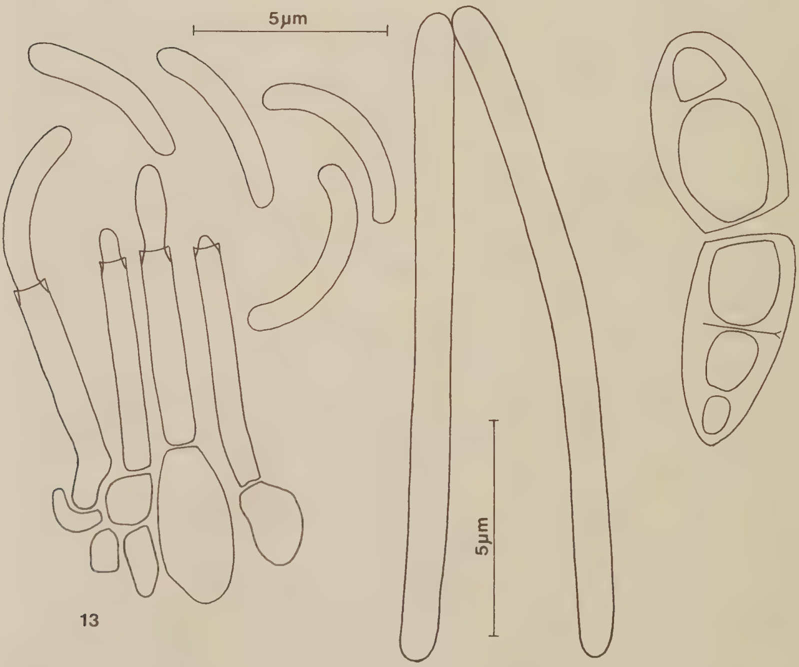

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Fig. 12-13. *Opegrapha filicina* Mont. New Guinea, *Demoulin* 5952 & *Smeets* (LG). 12 : Different stages of the spore ontogeny; 13 : Conidiophores (phialides) and conidia of two different types.

Thallus ± circular, up to 1 cm diam., sometimes larger, very badly delimited at the margins, without any visible hypothallus, usually discontinuous (most probably because of thallus brittleness, being easily flaked off), surface smooth, pale green to green. Ascocarps abundant, linear, irregularly bent or undulate, bifid or trifid, 0.8-1.5(-1.9) mm long, 80-90 µm wide, slightly prominent; margins at first covered by thallus but soon exposed, black; disc linear, greyish. Excipuloid tissue carbonaceous, triangular in transverse section, at first covered by thallus, e.g. the algal layer (± 10 µm thick). Hymenium 65-75 µm high, hyaline; epithecium 10 µm thick, hyaline; hypothecium 10 µm thick, greyish to pale brown. Paraphyses not very abundant, 1-1.2 µm thick, branched and anstomosed. Asci 50-55 µm high, thick-walled, ovoid to largely clavate, 8-spored. Spores oblong to fusiform, slightly but distinctly microcephalic (the middle cell being slightly larger, especially when young), remaining 1-septate for a long time but quite early with 5 distinct loculi, when old usually with 3-4 complete septa, distinctly constricted at the first septum and easily broken at that level, 19-23 x 5-7 µm, plus a 1-3 µm thick halo when observed in a KOH solution. Pycnidia abundant, circular, adnate and slightly prominent, 0.075-0.1 mm in diam., appearing as black dots, at first covered by the thallus but soon totally exposed, opening by a central ostiole. Conidia of two types, sometimes produced within the same pycnidium : crescent-shaped and 4-5 x 1 µm or filiform (but not rigid, usually ± deformed) and 15-16 x 1 µm; conidiophores abundant, forming a compact layer but only present at the bottom of the pycnidium; conidiogenous cells enteroblastic, phialidic but not proliferating, with conidia arising terminally. Phycobiont : probably *Phycopeltis*; cells angular to oblong, 7-10 x 5-6 µm, forming a continuous plate.

Porina pseudofulvella Sérusiaux

Republic of South Africa, Natal Prov., Nkandla National Forest (between Nkandla and Eshowe), ± 1150 m, forest, 1982, *Lambinon* 82/266 & *Sérusiaux* (LG).

This species was previously known only from the type-locality in Kenya (Sérusiaux 1979b). The Nkandla Forest in Natal was found to shelter a rather rich foliicolous lichen flora. So far, eleven species have been determined : *Porina nitidula* Müll. Arg. (new for South Africa), *P. epiphylla* (Fée) Fée with the parasymbiontic *Opegrapha phylloporinae* Müll. Arg., *Gyalectidium filicinum* Müll. Arg. (new for S.A.), *G. aspidotum* (Vainio) R. Sant. (new for S.A.), *Echinoplaca pellicula* (Müll. Arg.) R. Sant. (new for S.A.) with the parasite *Hansfordiellopsis lichenicola* (Bat. & Maia) Deighton, *Catillaria bouteillei* (Desm.) Zahlbr., *Bacidia apiahica* (Müll. Arg.) Zahlbr. (new for S.A.), *B. fuscatula* (Müll. Arg.) Zahlbr. (new for S.A.), *Byssoloma leucoblepharum* (Nyl.) Vainio, *Tapellaria epiphylla* (Müll. Arg.) R. Sant. (new for S.A.) and *Lopadium puiggarii* (Müll. Arg.) Zahlbr. (new for S.A.).

Tapellaria bilimbioides R. Sant.

U.S.A., Florida, Coconut Grove, 1897, *Thaxter* (FH). Costa Rica, Puntaneras Prov., on the Pacific Coast, Pto Quepos, Parque Nacional de la Punta Catedral, primary forest along the beach, 1979, *Sérusiaux* 3359 (LG).

Tapellaria bilimbioides is known from Sumatra and the Phillipines (Santesson 1952), India (Awasthi & Singh 1973) and from Cuba and Puerto Rico (Sérusiaux 1976). The two collections mentioned here considerably extend its distribution range in the New World.

Tapellaria nana (Fée) R. Sant.

U.S.A., Florida, Sanford, on palmetto leaves, 1915, *Rapp* (FH, LG).

Tapellaria nana is closely related to *T. epiphylla* in having only one muriform spore per ascus; it is distinguished by the presence of a thin greyish pruina on the apothecial dic. Known formerly from Brazil, Cuba and Hawaï.

Tapellaria nigrata (Müll. Arg.) R. Sant.

New Guinea, Madang Prov., rain forest between Awar Plantation and Boroi (S 4°06'; E 144°48'), at sea level, foliicolous on palm tree, 1980, *Demoulin* 5956 & *Smeets* (LG).

This collection is identical to another one made in Brazil, Matto Grosso, Serra de Chapada by *Malme* (n° 4050b, S) : the spores are 5-septate, as mentioned by Santesson (1952). I was ready to describe these two specimens as belonging to a new species, but on the occasion of a careful scrutiny of the plentiful collection from New Guinea, I discovered several spores with 7 septa (the spores are (4-)8 per ascus, measure 21-29 x 5-6(-7) µm; when 4 in the ascus, they reach 28-30 x 6-7 µm). Spore septation and size are not very variable within the genus and proved to be good characters for the delimitation of the species (see Santesson 1952) but I believe the discrepancy of these specimens from the typical populations of *T. nigrata* is too small to warrant separate taxonomic status, at least for the time being.

T. nigrata is here recorded for the first time in Asia. It was formerly known from South America and Africa. The collection from New Guinea is parasitized by *Ampullifera ugandensis* Deighton, a distinctive hyphomycete with elongate-ampulliform and rather long (up to 15 µm) hyphopodia and lemoniform truncated conidia (see Hawksworth 1979 for a more complete description).

SPECIES RANGE EXTENSIONS (not mentioned in the text)

Species	First record for :	Collection and herbarium where the material is preserved
Aspidothelium fugiens (Müll.Arg.) R. Sant.	New Caledonia	*Bamps* 5814b - LG
Byssoloma subdiscordans (Nyl.) P.James	New Caledonia	*Bamps* 5814b - LG
Calenia microcarpa Vězda	New Caledonia	*Bamps* 5854b - LG
Calenia submaculans R. Sant.	Colombia	*Schultes* & *Cabrera* 13738 in *Vězda* Lich.Sel. Exsiccati n° 1880 - LG
Catillaria bouteillei (Desm.) Zahlbr.	New Caledonia	*Bamps* 5854b - LG
Echinoplaca epiphylla Fée	New Caledonia	*Bamps* 5845b - LG
Lasioloma arachnoideum (Krempelh.) R. Sant.	Costa Rica New Caledonia	*Sérusiaux* 3359 - LG *Bamps* 5814b, 5854b - LG
Linhartia patellarioides (Rehm) Vězda	Senegal	*Vanden Berghen* 2459b - LG
Lopadium elliottii (Vainio) Zahlbr.	Costa Rica	*Sérusiaux* 3359 - LG
Opegrapha filicina Mont.	Costa Rica	*Sérusiaux* 3359 - LG
Phyllophiale alba R. Sant.	Costa Rica	*Sérusiaux* 3359 - LG
Porina nitidula Müll. Arg.	Costa Rica	*Sérusiaux* 3359 - LG
Sporopodium xantholeucum (Müll. Arg.) Zahlbr.	Costa Rica	*Sérusiaux* 3359 - LG

ACKNOWLEDGEMENTS

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SEM photographs were taken at the Jardin Botanique national de Belgique with a microscope Philipps 501 B. Unless otherwise stated, the material was prepared by the critical point method. I wish to thank the Director, Prof. J. Petit, who allowed me to use the instrument, and Dr. J. Rammeloo and M. Verhaegen for their most precious help.

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EXOPHIALA CASTELLANII SP. NOV.

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ABSTRACT

Exophiala castellanii Iwatsu, Nishimura et Miyaji, sp. nov. is described and illustrated.

De Hoog (6) has suggested that a strain (CBS 158.58), sent by A. Castellani to the Centraalbureau voor Schimmelcultures (CBS), Baarn, The Netherlands as 'culture derived from the type of *Microsporum mansonii* Castellani, 1905', cannot be considered the type. According to McGinnis (11, 12), this culture probably originated later, in 1911, from a patient with tinea nigra. Upon re-evaluation, CBS 158.58 is described herein as a new species of *Exophiala*.

Exophiala castellanii Iwatsu, Nishimura et Miyaji, sp. nov. (Figs. 1, 2).

> *Rhinocladiella mansonii* (Castellani) Schol-Schwarz sensu Schol-Schwarz, Antonie van Leeuwenhoek 34: 122, 1968, pro parte; non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2: 1271, 1905, nomen dubium.
>
> *Exophiala mansonii* (Castellani) de Hoog sensu de Hoog, Stud. Mycol. No. 15. Centraalbureau voor Schimmelcultures, Baarn, p. 114, 1977, pro parte; non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani,

Brit. Med. J. 2: 1271, 1905, nomen dubium.

Coloniae primum fermentoideae, deinde velutinae, post 14 dies ad temperaturam 27 C in agaro Sabouraudii dextrosi 4 mm diametro, ex hyphis brevibus aeriis tectae, rugosae, griseo-nigrae; reverso nigro. Mycelium superficialis vel parte immersum, ex hyphis cylindricis vel toruloideis, septatis, ramosis, glabris, pallide olivaceis compositum. Conidiophora semi-macronemata vel micronemata, simplicia, glabra, pallide olivacea. Cellulae conidiogenae (annellides) terminales vel intercalares, nonnumquam laterales, 5-15 X 1.5-3 (mediae 9.1 X 2.2) µm, lageniformes, cylindricae vel obclavatae, glabrae, pallide olivaceae; cellula conidiogena quisque cum rostro conidiofero uno vel interdum rostris conidioferis duobus vel tribus, minioribus 1 µm longis, cylindricis, saepe versus apicem latioribus, instructa. Conidia continua, ellipsoidea vel brevi cylindricae, pyriformia, 2.5-5 X 1.5-3 (mediae 3.5 X 2.1) µm, glabra, hyalina, basi subtruncata, apice obtusa. Cellulae gemmantes ellipsoideae usque subglobosae, 3.5-8 X 2.5-4 (mediae 4.9 X 3.4) µm, glabrae, hyalinae vel pallide brunneae.

Auctus in mediis culturatum omnibus ad temperaturam 37 C praesens, sed ad temperaturam 40 C absens, et ad pH 10.7 absens.

Teleomorphosis ignota.

Holotypus: IFM 4702 in herbarione quas 'Research Institute for Chemobiodynamics, Chiba University, Chiba, Japan'. Isolatus e dermate hominis rasili, in Ceylon, in 1911, leg. A. Castellani.

Etymology: *Exophiala castellanii* is named in honor of Dr. A. Castellani, mycologist.

Colonies on Sabouraud's dextrose agar attaining a diameter of 4 mm in 14 days at 27 C, initially yeast-like, later becoming velvety, covered with short aerial hyphae, wrinkled, grayish black with a black reverse. Mycelium superficial or partly immersed, composed of cylindrical to toruloid, septate, branched, smooth, pale olivaceous hyphae. Conidiophores semi-macronematous to micronematous, simple, smooth, pale olivaceous. Conidiogenous cells annellidic, terminal or intercalary, occasionally lateral, 5-15 X 1.5-3 (average 9.1 X 2.2) µm, lageniform, cylindrical or obclavate, smooth, pale olivaceous; each provided with one, sometimes two or three conidiiferous pegs of less than 1 µm

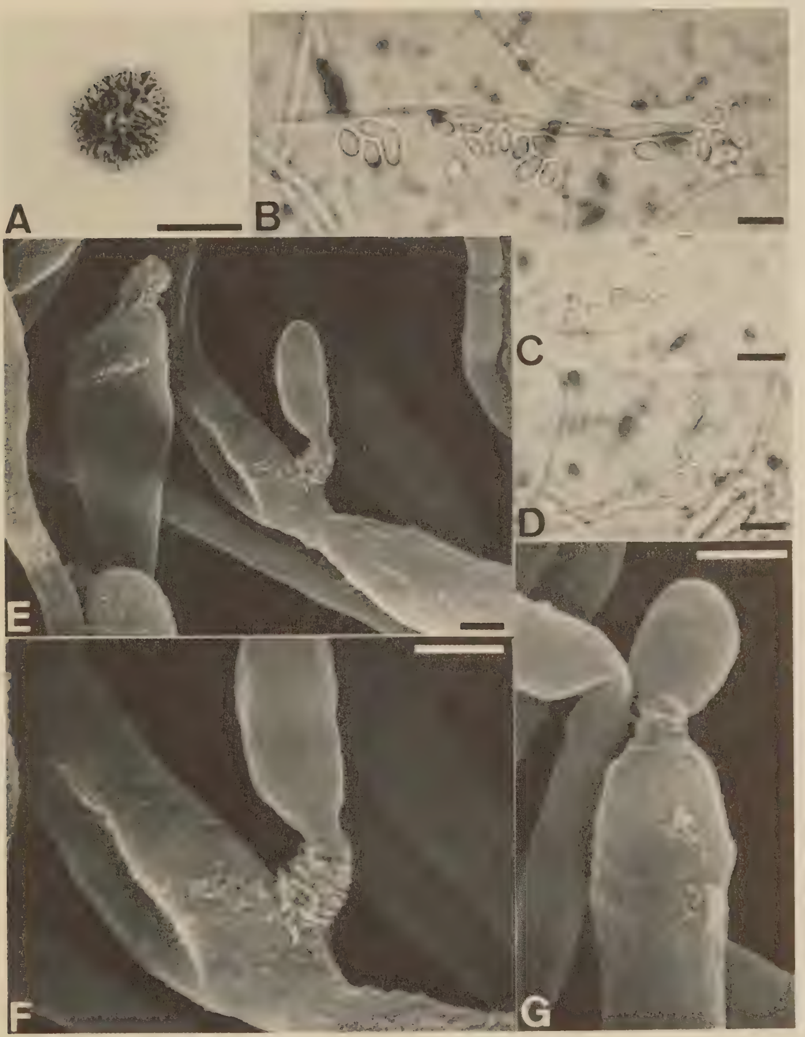

Figure 1. *Exophiala castellanii* (IFM 4702).
A) Thirty five-day-old colony cultured on Sabouraud's dextrose agar at 27 C, Bar=1 cm. B-D) Conidiogenous cells and conidia, Bar=5 µm. E-G) Scanning electron microphotographs, Bar=1 µm. E) Conidiogenous cells. F) High magnification of intercalary conidiogenous cell with conidium shown in Fig. 1, E. G) Terminal conidiogenous cell and conidium.

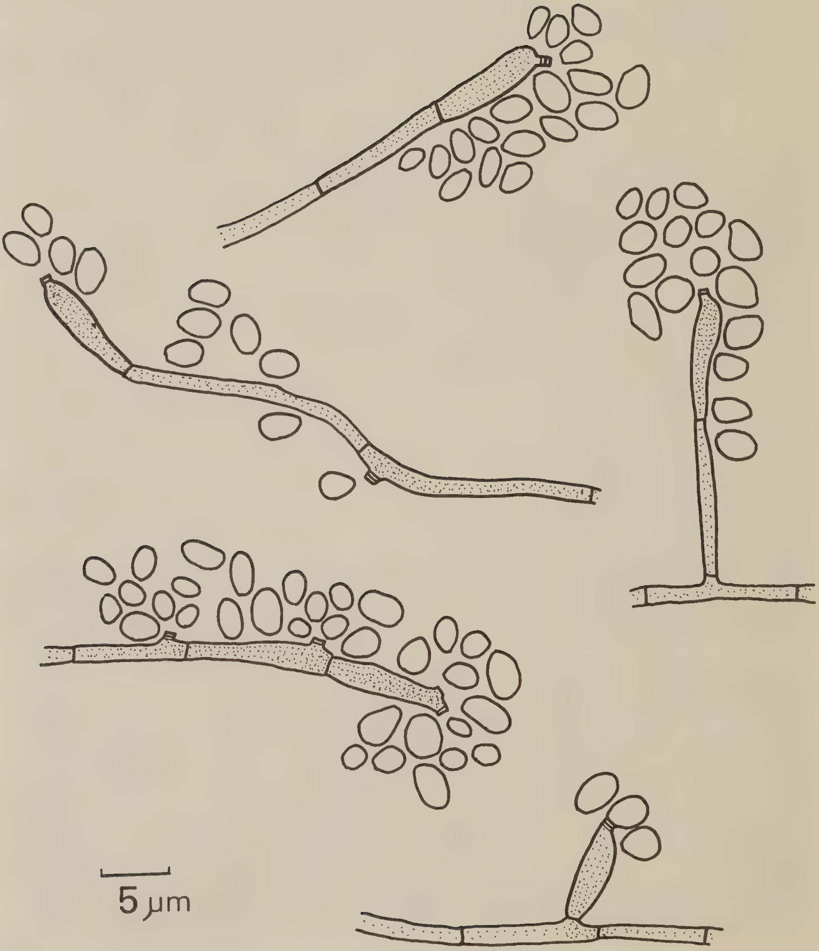

Figure 2. *Exophiala castellanii* (IFM 4702). Conidiogenous cells and conidia.

which are cylindrical, often slightly wider towards the tip. Conidia non-septate, ellipsoidal to short cylindrical, pyriform, 2.5-5 X 1.5-3 (average 3.5 X 2.1) µm, smooth, hyaline, subtruncate at base, obtuse above. Budding cells ellipsoidal to subglobose, 3.5-8 X 2.5-4 (average 4.9 X 3.4) µm, smooth, hyaline or pale brown.

Growth on usual media is present at 37 C, but absent at 40 C. Growth is also absent at pH 10.4.

Teleomorph is unknown.

Material examined: Culture received from the CBS, No. 158.58, isolated from human skin scrapings in Ceylon in 1911 by A. Castellani. The holotype, IFM 4702, is preserved at the Research Institute for Chemobiodynamics, Chiba University, Chiba, Japan. Living cultures have been preserved at the CBS (No. 158.58) and the American Type Culture Collection, Maryland, U.S.A. (No. 18657).

In 1911, Castellani probably isolated a dematiaceous fungus from a patient with tinea nigra, even though this fungus may not have been the etiological agent of the disease but simply a contaminant (4, 11, 12). He identified the fungus as typical of *Microsporum mansonii*, which had been described in 1905 by himself as the etiological agent of pityriasis versicolor nigra and is now considered to be a synonym of *Malassezia furfur* (Robin) Baillon, 1889 (4, 11, 12). Afterwards, he sent this isolate to the major culture collections as 'culture derived from the type of *M. mansonii*' (4, 11, 12). In 1968, Schol-Schwarz (13) studied this culture and proposed the new combination *Rhinocladiella mansonii*. As the name *M. mansonii* is now considered as a synonym of *Malassezia furfur*, the binomial *R. mansonii* becomes a facultative synonym of *Malassezia furfur*. In 1977, de Hoog (6) considered that the taxonomic confusion surrounding *M. mansonii* could be attributed to absence of a herbarium specimen (type material). He designated CBS 158.58 as a neotype. He concurrently proposed the new combination *Exophiala mansonii* for the material. However, the morphological characteristics of this neotype were apparently different from those of *M. mansonii* in Castellani's original description (3). As pointed out by McGinnis (12), de Hoog's designation of the neotype is in conflict with the International Code of Botanical Nomenclature (Seattle Code, p. 76). Consequently, *E. mansonii* becomes an obligate synonym of *M. mansonii* and a facultative synonym of *Malassezia furfur*.

In 1968, Schol-Schwarz (13) reported that four anamorphs, sympodula, phialides, annellides and one with *Cladosporium*-like morphology, were observed in the culture CBS 158.58. De Hoog (6) re-examined it and insisted that the mode of conidium ontogeny in the culture was only annellidic. On the contrary, McGinnis (11) stated that conidia were produced from phialides without collarettes, while annellides were not found in the culture. Our observation using a scanning electron microscope clearly indicated that the mode of conidium ontogeny in IFM 4702 (CBS 158.58) is annellidic (Fig. 1. E-G). Neither phialoconidia, sympodioconidia nor catenulate blastoconidia were observed in this material. This result of the authors' coincides with the description of *E. mansonii* by de Hoog (6). Thus, the strain CBS 158.58 can be accommodated in the genus *Exophiala*, which is characterized by closely annellated conidiogenous cells.

The genus *Exophiala* was established by Carmichael (2) in 1966 to accommodate *E. salmonis*, a pathogen of fish. Subsequently, several species have been added to the genus (1, 5-10). *Exophiala castellanii* is somewhat similar to *E. spinifera*, *E. jeanselmei*, *E. alcalophila* and *E. dermatitidis*. However, it can be distinguished from *E. spinifera* and *E. jeanselmei* by its restricted growth. The colonies of *E. castellanii* reach a diameter of less than 6 mm after incubation for 14 days at 27 C on Sabouraud's dextrose agar, whereas those of *E. spinifera* and *E. jeanselmei* reach a diameter of over 10 mm after incubation for 14 days under the same cultural conditions. In addition, *E. castellanii* is distinguished from *E. spinifera* and *E. jeanselmei* by its shorter and less tapering conidiiferous pegs. *Exophiala castellanii* differs from *E. alcalophila* and *E. dermatitidis* in colony appearance. The colonies of *E. castellanii* become more or less velvety with age, while those of *E. alcalophila* remain yeast-like. In old cultures on Sabouraud's dextrose agar, the colonies of *E. castellanii* are often wrinkled in a brain-like manner (Fig. 1, A), whereas those of *E. dermatitidis* are almost flat. Furthermore, *E. castellanii* is readily distinguished from these two species in some physiological characteristics. *Exophiala castellanii* has no ability to grow on alkaline media, such as at pH 10.4, while *E. alcalophila* grows well at this pH. *Exophiala castellanii* has no ability to grow at 40 C, whereas *E. dermatitidis* has the ability to grow at this temperature.

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A NEW SPECIES OF *AMANITA* IV.

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ABSTRACT

Amanita radiata (fig. 1) is described as new. It appears to be another intermediate between sections *Lepidella* and *Validae*.

Amanita radiata Jenkins, sp. nov.
Holotype: Alabama - hiway rest area between Florala and Opp, Alabama, 11. vi. 1981, Jeannie and David Jenkins 1642(DTJ).

Corpus fructus medius, solus. PILEUS: quanto 70 mm latus, planus convexusque convertens in plano, fuscus ad fulvus, margo tenuissime striatus, fulgens, teres, margo tenuissime convexus, tenuissime appendiculatus, caro albus, quanto 7 mm crassus ad centrum; reliquiae universi teguminis ita panni in orbe moderate crassi, albi, floccosi membranique. LAMELLAE: moderate densae, anexae, angustae, gilvae; lamellulae moderate copiosae, attenuateae. STIPES: 45-60 x 10-13 mm, sursum fastigatus et tenuissime expassus ad apicem, solidus, fibrillosus convertens insuperficie fibrilloso squameoque; tegumen partim et in forma apicis, fugacius, albus; bulbus ad basem ovatus, 40 x 25 mm; tegumen universale ita ora tenuissima, floccosa membranataque quod frangit in pannos. Odoratio aut gustatus non distinctus. SPORES: 3.91-5.50 x 8.59-10.15 μm.

Fruit body medium, solitary. PILEUS: up to 70 mm diam, plano-convex to plane, brown to yellowish-brown, margin very slightly striate, shiny, smooth, but pigment having the appearance of radial fibrils, margin very slightly incurved, not appendiculate, not exceeding gill edge, flesh white, up to 7 mm thick at center; universal veil remnants as moderately thick, whitish, floccose-membranous, patches on disc. LAMELLAE: moderately crowded, adnexed, narrow, white; lamellulae moderately abundant, attenuate. STIPE: 45-60 x 10-13 mm, tapering upward and slightly expanded at apex, solid, fibrillose to fibrillose-scaly, brownish; partial veil apical, fugaceous, white; basal bulb oval, 40 x 25 mm; universal veil as a very slight, floccose-membranous rim, breaking up into patches. No distinct smell or taste.

PILEIPELLIS: filamentous hyphae 2-7 μm diam, interwoven, distinctly gelatinized near surface, oleiferous hyphae moderately abundant. PILEUS TRAMA: filamentous hyphae moderately abundant, up to 8 μm diam; inflated cells numerous, elongate, terminal or short, terminal chains. LAMELLA TRAMA: bilateral; filamentous hyphae 2-7 μm diam, moderately branched, without clamps; inflated cells mostly clavate, up to 230 μm long, terminal or in short, terminal chains.

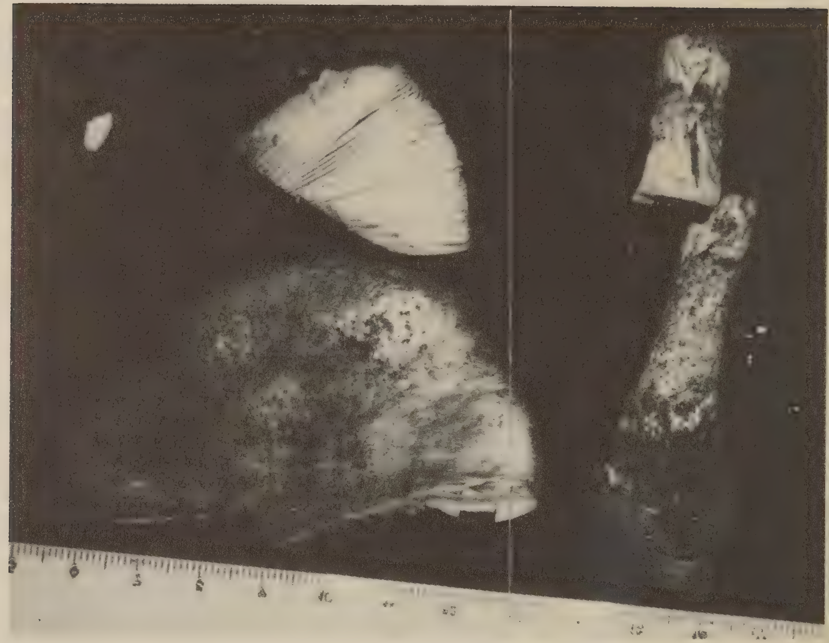

Fig. 1. *Amanita radiata* Jenkins (DTJ 1642)

SUBHYMENIUM: inflated ramose to subcellular, filamentous hyphae without clamps, up to 7 µm diam. BASIDIA: up to 39 x 4-11 µm, 4-sterigmate, without clamps. UNIVERSAL VEIL: on pileus a moderately dense tissue of irregularly disposed, filamentous hyphae and inflated cells; filamentous hyphae abundant, up to 6 µm diam, without clamps, moderately branched, oleiferous hyphae sparse; inflated cells mostly broad, globose to broadly elliptic, up to 93 x 93 µm, few elliptic cells, up to 109 x 46 µm, mostly terminal chains: material on base of stipe similar to that on pileus with the exception that the inflated cells are usually not as large. STIPE TRAMA: filamentous hyphae moderately abundant, 3-7 µm diam, sparsely branched, without clamps; inflated cells up to 250 x 18 µm, mostly cylindrical, terminal, longitudinally oriented. PARTIAL VEIL: mostly variform inflated cells with filamentous hyphae.

SPORES: 3.91-5.50 x 8.59-10.15 µm ($\underline{E}$ = 1.71-2.20; $\underline{E}^m$ = 1.93), elongate to cylindric, adaxially flattened, thin walled, hyaline, amyloid, spore print white; contents guttulate; apiculus sublateral, cylindric.

Habitat and distribution: terrestrial under loblolly pine and oak, Alabama.

Collections examined: hiway rest area between Florala and Opp, AL, 11. vi. 1981, Jeannie and David Jenkins 1642(DTJ): Oak Mountain State Park, Pelham, AL, 9. vii. 1982, David Jenkins 1736(DTJ).

The genus *Amanita* is commonly divided into six sections: *Amanita*, *Vaginatae*, *Lepidella*, *Validae*, *Amidella*, and *Phalloidae* (Corner & Bas, 1962). The characteristics used to separate these six groups are fairly distinct, but there are occasions in which difficulty is experienced when attempting to place a specimen into one of these taxonomic groups. This difficulty is, of course, due to the great variability which can occur in macroscopic and microscopic characters.

Such a situation was noted in the publication of *Amanita media* (Jenkins, 1983). There it was found that definitive characters for both section *Lepidella* and *Validae* were exhibited in this new taxon. A very similar situation exists with the taxon being described in this article. *Amanita radiata* possesses characteristics of both sections.

Amanita radiata is characterized by a brownish to yellowish-brown pileus which has distinct, innate, radial striations, whitish, floccose-membranous volval patches, a whitish stipe with brownish fibrils, and elongate to cylindric spores. This combination of features makes *Amanita radiata* distinct. When trying to associate this organism with a particular section, however, it can be related to members of two separate sections, *Lepidella* and *Validae*. The spore size and the fugaceous partial veil is more typical of members of section *Lepidella*, whereas, the deeply pigmented pileus and the pileus margin which is neither appendiculate nor exceeds the gill edge is more characteristic of section *Validae*.

Every taxonomist must realize that there are no absolutes in taxonomy, and that the dividing line between taxonomic groups is precarious at best. Such appears to be the case of the separation between sections *Lepidella* and *Validae*. At the moment I have no proposals to attempt to rectify this situation. Further study of organisms which appear to bridge these two sections may lead to a solution. For the time being, it should be recognized that *Amanita radiata* can possibly be keyed out into either section *Lepidella* or section *Validae*.

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MYCOTAXON

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ALTERNARIA ABUTILONIS (PASSERINI) JOLY A NEW EMENDMENT

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While searching the literature on fungi pathogenic to species of the genus *Abutilon* Miller (*Malvacecae*), we found a paper on "*Macrosporium abutilonis* Spegazzini" (Saccardo, 1982).

Macrosporium abutilonis Passerini was described for the first time on an *exsiccatum* label of Collection G. Spegazzini in *Decades Mycologiacae Italicae* (now included in the *Herbarium Mycologicum* P.A. Saccardo) with number 458, and with the following description:

"*Amphigenum; caespitulis in macula subdisciformi olivaceo fusca, aggregatis; hyphae articulatae, fumeso - hyalinae; conidia clavata, 5 - 7 septata et muriformia, pallide, flavo-fumida, prorsus pellucida, stipite subaequilongo basi attenuatoi concolore fulta 50 - 90 (cum stipite) x 10 - 15.*
Hab.: ad folia languida Abutilonis avicennae Parmae R. Horto Botanico, Aug. 1878, leg. Dr. G. Passerini".

Saccardo (*loc.cit.*) wrongly attributed this species to Spegazzini and accurately quoted original description.

Lindau (1910) and Ferraris (1910), referring to Saccardo's work, repeated the same description as well as the wrong attribution to Spegazzini in both German and latin languages.

Later, the genus *Macrosporium* Fries was included in two genera: *Alternaria* Nees and *Stemphylium* Wallr. (Wiltshire, 1963, 1938).

Joly (1964), taking in account the suppression of genus *Macrosporium*, included this species in a list of *Alternaria* species having doubtful systematic position and minted for it the *combinatio nova: Alternaria abutilonis* (Spegazzini) Joly.

In meantime, no other description has been reported.

Since the original description appears obviously inadequate,we propose its emendment.

Through the courtesy of Dr. G.Lorenzoni, Director of Orto Botanico of Padova, the type collection of *M. abutilonis* was made aviable, and reexamined by us.

The type is composed of leaf fragments of *Abutilon theophrasti* Medicus (= *A. avicennae* Gaertn.) showing dark spots on the upper surface of the blade, with clean borders, of 1 - 1,5 mm diameter.

Less extensively, these spots are also visible on the under surface of the blade.

The conidia (Fig. 1) are generally cone shaped "short-cone" according to classification by Neergaard (*loc.cit.*), nearly always lacking a beak (1), burnt amber colored (Maerz and Paul, 1930), with a smooth surface, and showing 3 - 15 transverse and 0 - 6 longitudinal or oblique septa (see table I).

The characters of the specimen allow us to propose the following emendement:

Alternaria abutilonis (Passerini) Joly emend. nov.

"*Maculae fuscae, epiphillae, in rotunditatem vergentes, usque ad 1 - 1,5 mm diametri. Conidia conica leviaque cum 3 - 15 septa trasversa et 0 - 6 septa in longitudinem vel obliqua, muriformia et raro rostrata. 31,3 µm - 114,8 µm (sine rostro) x 10,4 µm - 19,1 µm. Color succinum ustum.*

Hab.: in foliis Abutilonis theophrasti Medicus.

Dr. Verona is gratefully acknowledged for critical reading of the manuscript.

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(1) Percentage of conidia with beak: 8%. Dimensions of beak: length µm 7,8 - 17,4; width µm 1.

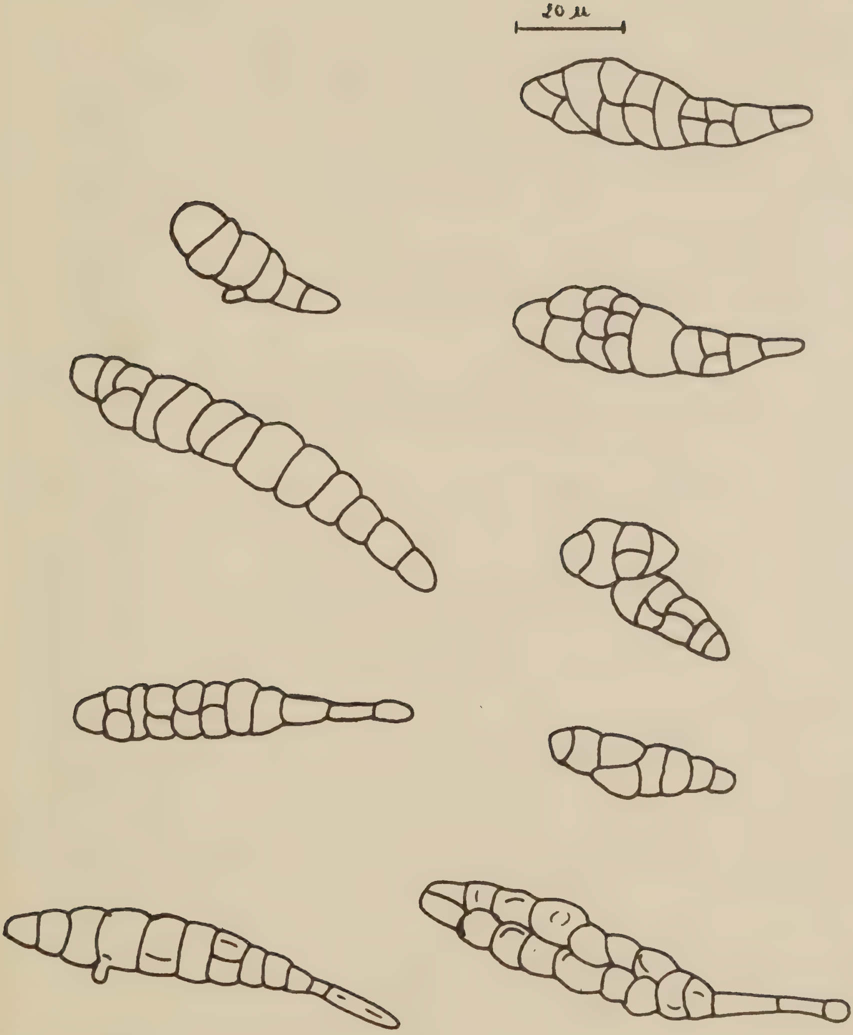

Fig. 1. - *Alternaria abutilonis*: conidia drawn from the type.

Table I.

Biometrical data of examined *Alternaria abutilonis*.

Conidia	Average (M)	S.D. (σ)	T.V.	Modal value	Medial value	Highest value	Lowest value	Range
L. (µm)	63,5	± 14,5	42,6-68,7	52,2	62,6	114,8	31,3	83,5
1. (µm)	17	± 1	13,9-14,8	16	16	19,1	10,4	8,7
L/1	3,7	± 1,1	2,6-4,8	4	4	8	8	6
S	7,1	± 2,4	4,7-9,5	8	7	15	3	12
s	2,6	± 1,4	1,2-3,9	2 e 3	2	6	0	6

L = Body length of conidia
1 = Body width of conidia
L/1 = Ratio length / width
S = Number of transversal septa
s = Number of longitudinal or oblique septa
T.V. = Typical values; all values included between M − σ and M + σ. These values are considered because they are used as index of diversity betweeen species. (Blumer, 1967).

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MYCOTAXON

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GLAZIELLA AURANTIACA (ENDOGONACEAE): ZYGOMYCETE OR ASCOMYCETE?[1]

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SUMMARY

The septa in sporocarpic tissues of *Glaziella aurantiaca* (Berk. & Curt.) Cooke are examined with transmission electron microscopy. The septa are typical of those of various taxa of ascomycetes; on this basis it is proposed that G. *aurantiaca* be removed from the Endogonaceae and tentatively placed in the Deuteromycetes.

Glaziella aurantiaca (Berk. & Curt.) Cooke is characterized by bright orange, spherical sporocarps that are hollow, lobed, up to 5 cm in diameter and very loosely attached to the soil, if at all (Thaxter, 1922; Boedijn, 1930; Rogers, 1947). The spores are embedded in the thin walls of the sporocarps. It was first collected in Cuba and described by Berkeley and Curtis (1869) as a species of *Xylaria* due to the fleshy nature of the sporocarps. Berkeley (1879) first proposed the genus *Glaziella* for a specimen of this fungus collected in Brasil and placed it in the Hypocreaceae. It was subsequently collected in various islands of the West Indies and described as a pyrenomycete, since the large, often empty spores, embedded in the walls of the fleshy sporocarp, apparently looked like young perithecia to these early workers (Boedijn, 1930). Von Höhnel (1913) collected it in Borneo and was the first person to recognize that they were chlamydospores and, for the first time, placed this taxon in the Endogonaceae, since this family included other sporocarpic, chlamydosporic species.

Thaxter (1922) undertook a revision of the family Endogonaceae in which he studied the type material of several species that were described as *Glaziella*. He concluded that *Glaziella* was a monotypic genus and that other published species were either identical to the type material of G. *aurantiaca*, represented sterile *Entonaema liquescens* Moeller (Xylariaceae), or were other unknown ascomycetes. Boedijn (1930) studied two collections from the East Indies and elaborated on the morphological characters of the species. He further pointed out that G. *aurantiaca* was the valid name, not G. *vesiculosa*

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[1] Florida Agricultural Experiment Station Jour. Ser. No. 5376

Berk., as Thaxter (1922) had assumed it to be. In a more recent treatment of the Endogonaceae, Gerdemann and Trappe (1974) included *Glaziella* as a monotypic genus. Subsequently, no new species has been described.

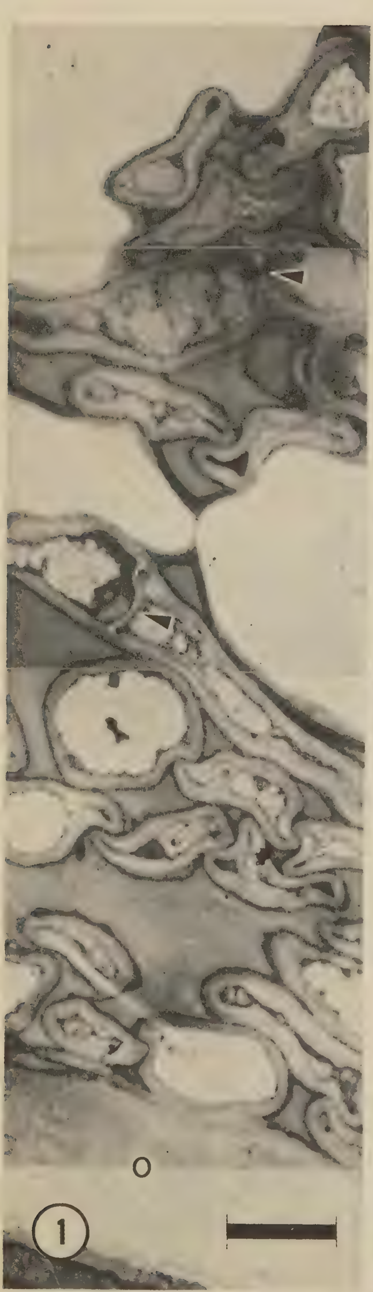
Thaxter (1922) noted the occurrence of frequent septa in the sporocarpic tissues of this fungus. He referred to this as contrary to the ordinary phycomycetous condition, and stated that, "A final opinion with regard to its true relationships can hardly be formed until the nature of the primary vegetative and sporogenous hyphae is known." Also, Boedijn (1930) pointed out the frequent septation of the sporocarpic hyphae of this fungus, although accepting it, without question, as a member of the Endogonaceae. Since a direct correlation has been confidently established between septal ultrastructure and higher taxonomic groups of fungi (Moore and McAlear, 1962; Gull, 1978), an investigation of the septa of this fungus was initiated using transmission electron microscopy.

Since fresh specimens of this fungus were not available, a dried herbarium specimen collected in Grenada (St. Mark Parish, Union, 500-1000 ft. elev., on ground, orange when fresh, coll. G. R. Proctor, November 21, 1957, det. A. L. Welden; FLAS-F53685) was obtained from Dr. R. K. Benjamin and examined. The specimen was rehydrated in deionized water at 4 C overnight. Hand-sectioned material of this specimen was then fixed for 2 h at room temperature in 2% (w/v) paraformaldehyde, 2.5% (v/v) glutaraldehyde and 2mM calcium chloride in 0.1 M sodium cacodylate buffer (pH 7.2). The material was rinsed in 0.1 M cacodylate buffer, postfixed in 1% (w/v) osmium tetroxide in 0.1 M cacodylate buffer and dehydrated in an ethanol series followed by acetone. The material was embedded in ERL 4206 resin (Spurr, 1969) and sectioned on a Porter-Blume MT-2 ultramicrotome with a diamond knife. The sections were collected on one-hole, formvar coated copper grids, stained for 1 h in 2% (w/v) aqueous uranyl acetate followed by 10 min in Reynolds (1963) lead citrate. The material was examined at 75kV on an Hitachi HU-11C transmission electron microscope.

When viewed with the light microscope, the hyphae of the sporocarps examined were regularly septate and closely adherent to the surface of the spores. When examined with the electron microscope, these septa have a simple, central pore that is frequently plugged with electron opaque material, and are usually associated with one or more Woronin bodies (Figs. 1-3). These septa are typical of those that have been reported in various taxa of ascomycetes (Benny and Samuelson, 1980; Curry and Kimbrough, 1983) and in deuteromycetes with ascomycete teleomorphs (Mason and Crosse, 1975; Bronchart and Demoulin, 1975).

→

Figures 1-3. *Glaziella aurantiaca*. 1. Cross section of a portion of the sporocarp wall showing the outermost wall layer (o) of a spore with attached hyphae, including representative septa (arrowheads) (bar= 2.0 µm). 2. Higher magnification of a somewhat nonmedian section through a septum with a central plug (p) and associated Woronin body (w) (bar= 0.5µm). 3. Median section of a septum showing a dense, biconvex plug (p) and associated Woronin body (w) (bar= 0.5µm).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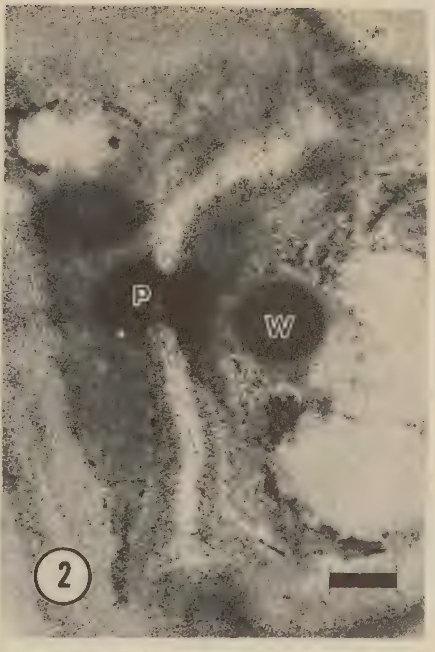
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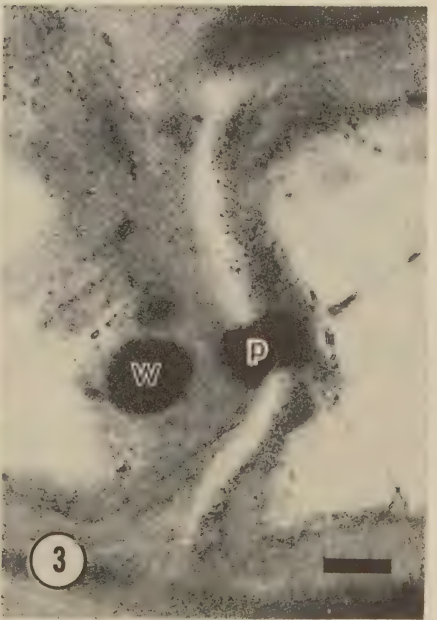
W
P
③

Ultrastructural research is in progress to obtain additional information on spore structure. However, on the basis of the available evidence, it is proposed that *G. aurantiaca* be removed from the Endogonaceae and placed tentatively in the Deuteromycetes until more conclusive information is obtained regarding its teleomorphic nature.

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MYCOTAXON

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TYPE STUDIES IN THE POLYPORACEAE 16. SPECIES DESCRIBED BY J.M.BERKELEY, EITHER ALONE OR WITH OTHER MYCOLOGISTS FROM 1856 TO 1886.

by
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SUMMARY

Of the 336 polypores Berkeley described, either alone or together with other mycologists from 1856 to 1886, 79 are accepted, 219 are synonyms, 23 types were too badly developed to establish their identity, 10 types were not found and 5 names are invalid. 20 new combinations are proposed and 13 species are described in detail.

This is the third and final part of a series treating the polypores described by J.M. Berkeley, either alone or together with other mycologists, from 1856 to 1886. For the two first parts, see Ryvarden (1976 & 1977). The types for all species are in the Kew Herbarium and this information is not repeated for each species.

The species are placed alphabetically according to specific epithet and the genera are abbreviated as follows: D = *Daedalea*, F = *Favolus*, G = *Gloeoporus*, H = *Hexagonia*, L = *Lenzites*, P = *Polyporus* and T = *Trametes*. After the name there is a reference to where the species was published.

The label is then cited in inverted commas, and if the text indicates no type locality, this is added in brackets. Explanations of abbreviations in the text or to old geographical names are also, when necessary, placed in brackets.

If the type was found to be a taxonomic synonym, this is indicated by = and followed by the correct name.

When the species has been accepted, it is cited in its proper genus with a reference to a modern description, or described in detail if no modern description seems to exist.

P. **abruptus** Berk. 1878 : 42.
«Aru Islands (Indonesia) Sept. 22,1874, Challenger».
= *Fomitopsis* sp. very young, immature and sterile specimen.

P. **acicula** Berk. & Curt. 1868 : 304.
«Cuba, C. Wright 95».
= *P. tricholoma* Mont, a small and immature specimen.

P. **aculeans** Berk 1856 : 199.
«No 188, Panuré, (Brazil)».
= *Corioplosis* cfr. *caperata* (Berk.) Murr, an almost glabrous form.

T. **aculeifera** Berk & Curt 1968 : 319.
«Cuba, C. Wright no 147.».
= *Echinopora aculeifera* (Berk. & Curt.) Ryv. comb. nov. Basionym:
Trametes aculeifera Berk. & Curt. Bot. J. Linn. Soc. 11 : 319, 1868.

Fruitbody pileate, broadly attached, up to 2 cm wide, 1 cm thick and some cm long in fused specimens, coriaceous when dry. Pileus densely covered with forked, flattened antlerlike hair in a dense mat, white to pale cream when fresh, becoming ochraceous in shades when dry, Pore surface white to cream, pores angular to irregular and split or sinuous, 1-2 per mm or radially up to 3 mm long, with channels or pores going up to the antlerlike hairs on the pileus and a context proper, mostly only seen close to the base up to 1 mm thick and cream to pale ochraceous.

Hyphal system dimitic, generative hyphae with clamps, 2,5-4 um in diameter, skeletal hyphae thickwalled, 3-5 um wide, the anthler like forked hairs of the pileus consist mainly of generative hyphae while skeletal hyphae are more common in the trama.

Basidiospores subglobose, hyaline, thinwalled and non-amyloid, 5-3 x 3-4.5 um. Conidiospores abundantly produced from generative hyphae on the pileus, ovoid to oblong ellipsoid, slightly thickwalled and hyaline, 12-15 x 4-5.5 um.

I have only seen specimens from Cuba and Brazil.

The species belongs in *Echinopora* because its conidiospores are produced in the pileus cover, its dimitic hyphal system and clamped generative hyphae. It is easily separated from the type species, *E. hydnophorus* as this species has a distinct hydnoid conidial stage and both basidiospores and conidia are of a slightly different form. A description of the genus and its type species can be found in Ryvarden & Johansen (1980 : 325).

T. **acupunctatus** Berk. 1872 : 164.
«Herberts Creek (Australia). E.M.Bowman».
= *Coriolopsis strumosa* (Fr.) Ryv.

P. **acupunctatus** Berk. & Br. 1873 : 52.
«No 651, S. of the island, (Sri Lanka), July 1868». = *Rigidoporus vinctus*(Berk.) Ryv.
The type collection is mixed as already noted on the envelope by Bresadola and there are three species involved. Specimen «b»is here selected as lectotype with the identity as indicated above.

H. **adnata** Berk. & Br. 1873 : 57.
«No 610 (Sri Lanka).»
= *D. sulcata* (Berk.) Ryv.

P. **aemulans** Berk & Curt. 1868 : 304.
«Cuba, C. Wright no 91».
= *Polyporus guyanensis* Mont. small specimen. This synonomy was already noted on the sheet by Bresadola.

P. **aggrediens** Berk. 1879 : 32.
«Rio de Janeiro (Brazil). Glaziou no 9106.»
= *Trametes membrancea* (Fr.) Kreisel.

P. **alabamae** Berk & Cook in Cooke 1878 : 130.
«on *Myrica cerifera*, Gainsville, Fla. (Florida, USA), Rav. 102».
= *Pachykytospora alabamae* (Berk.) Ryv. For a detailed description, see Lowe (1966 : 129) or Ryvarden & Johansen (1980 : 461).

H. **albida** Berk. 1878 : 47.
«Malamon island, Feb. 4, 1875, Challenger».
= *Lenzites vespacea* (Pers.) Ryv.

ERRATA, VOLUME TWENTY

Page 330	line	3	for	*Echinopora*	read	*Echinoporia*
		19	for	*Echinopora*	read	*Echinoporia*
		21	for	*E. hydnophorus*	read	*E. hydnophora*

P. **albo-cervinus** Berk. 1856 : 234.
«No 22. Ad truncos emort. Panuré, Dec. (Brazil).»
= *Trametes modesta* (Fr.) Ryv.

P. **albogilvus** Berk. & Curt. 1868 : 308.
«Cuba, Wright 415».
= *Tyromyces albo-gilvus* (Berk. & Curt.) Murr. For a description, see Lowe (1975 : 42).

P. **albostygius** Berk. & Curt. 1868 : 309.
«Cuba,»
= *Rigidoporus vinctus* (Berk.) Ryv. as already indicated by Bresadola (1896 : 283, see Lowe p. 25 1966).

P. **angustus** Berk. 1860 : 253.
«Tasmania (Australia)
= *Tyromyces tephronotus* (Berk.) Cunn. as already noted by Bresadola on the herbarium-sheet.

P. **augustus** Berk. 1856 : 143.
«In ramos emortus, Panure (Brazil) Jan.53».
= *Humphreya coffeatum* (Berk.) Stey. This was already noted by Furtado (1967 : 383).

P. **anoectoporus** Berk. & Curt. 1868 : 318.
«Cuba, Wright no 309«.
= *Dichomitus anoectoporus* (Berk. & Curt). Ryv. comb. nov. Basionym *Polyporus anoectoporus* Berk. & Curt. Bot. J. Linn. Soc. 10 : 318, 1868.
There is a good description in Lowe (1966 : 131) and there is no doubt that the species is related to *D. campestris* (Quel.) Dom. of Europe. The latter has, however, shorter spores. The Australian *D. leucoplacus* (Berk.) Ryv. is separated by having smaller pores and spores.

P. **anthelminticus** Berk. Card. Chron. 1866 : 753.
«P. anthelminticus Berk. in Gard. Chron.» «India«.
= *Amylosporus campbellii* (Berk.) Ryv.
Roy and De (1979) has a detailed description of the morphology and the culture characters of this species. However, they state clearly that the species has non-amyloid spores and also that that they are smooth. In the type of *P. anthelminticus* amyloid spores were found and its synonymy should be indisputable. Whether the taxon described by Roy and De is something different or *A. campbellii* has to be rechecked. It should be borne in mind that the fine ornamentation of the spores of *A. campbellii* is not seen unless the spores are examined in Melzers reagent.

P. **appendiculatus** Berk. & Br. 1873 : 48.
«Ceylon (Sri Lanka)».
= *Piptoporus soloniensis* (Fr.) Pilat. This species has been desribed several times from tropical areas, and further synonyms can be found in Schumacher & Ryvarden (1981).

P. **apricus** Berk. & Br. in Berk. 1860a : 252.
The type has not been found.

H. **arata** Berk. 1878 : 43.
«Aru Island (Indonesia) Sept. 22. 1874.»
= *Cyclomyces setiporus* Berk. Pat. as noted on the sheet already by O. Fidalgo.

P. **aratus** Berk. 1878 : 53.
«St. Howes Island (Australia). J.P. Fullager.
= *Coriolopsis strumosa* (Fr.) Ryv.

P. **archeri** Berk. 1860 : 255.
«Tasmania (Australia)».
= *Tyromyces merulinus* (Berk.) Cunn. as already noted on the sheet by Cunningham.

P. **arenicolor** Berk. & Curt. 1868 : 315.
«Cuba (Curtis) Wright, no. 454».
= *Trametes pavonia* (Hook.) Ryv. Also noted on the sheet by Bresadola.

P. **armeniacus** Berk. 1856 : 197.
«ad truncos emort. Panuré (Brazil)».
= *Trametes armeniaca* (Berk.) Ryv. comb. nov. Basionym: *Polyporus armeniacus* Berk. Hook. J. Bot. 8 : 197, 1856.
This species is apparently the same as is described as *Trametes roseola* Pat & Har. in Ryvarden & Johansen (1980 : 581). The latter was based on a specimen collected in Africa and as the type of *T. armeniaca* is sterile, it may be that there is a difference in spore-size. Only future collections of the South-American taxon can settle the question.

P. **aruensis** Berk. 1878 : 43.
«Aru Islands (Indonesia) Sept. 1874 Challenger.»
= *Trametes scabrosa*(Pers.) Cunningh.

P. **ascoboloides** Berk. 1872 : 162.
«Australia».
= *Perenniporia ochroleuca* (Berk.) Ryv. The type is not sterile as indicated by Cunningham (1965 : 265).

P. **atro-purpureus** Berk. 1856 : 194.
«Panuré (Brazil)».
= The type is unfortunately sterile, but the species belongs in the *Ganodermataceae* and is probably a sterile specimen of an *Amauroderma* species *(A. exile?).*

P. **atro-umbrinus** Berk. 1856 : 199.
«Spruce (Brazil)».
= *Polyporus infernalis* Berk.

D. **aulacophyllus** Berk. 1872 : 166.
«Australia».
= *Lenzites acuta* Berk.

P. **barbaeformis** Berk. & Curt. in Berk. 1872 : 53.
«Alabama (USA) Peters, on Vitis, no 4519».
= *Pachykytospora papyracea* (Schw.) Ryv.

L. **beckleri** Berk. 1872 : 161.
«No 10. Clarence River (Australia) Dr. Beckler».
= *Lenzites acuta* Berk.

P. **beckleri** Berk. 1872 : 162.
«Clarence River (Australia) Beckler».
= *Coriolopsis sanguinaria* (Kl.) Teng
The type is poorly developed but to me it looks like a small specimen of *P. sanguinaria* without a cuticle from the base. The hyphal system and colour is consistent with this species. No spores were seen.
The name *Trametes scobinaceus* (Berk.) Cunn. as used by Cunningham (1965 : 169) is invalid as the basionym (taken from a label) is a nomen nudum. Cunningham used *T. scobinaceus* because he wanted to transfer *P. beckleri* to *Trametes* and the combination *T. beckleri* is preoccupied by *T. beckleri* (Berk.) Imaz. (based on *Daedalea beckleri).*

P. **benetostus** Berk. 1878 : 52.
«Thaiti, Challenger».
= *Rigidoporus vinctus* (Berk.) Ryv.

P. **biferus** Berk. 1879 : 32.
Rio de Janeiro, M. Glaziou no 8546».
= *Junghuhnia undigerus* (Berk.) Ryv. see this species for a description.

P. **bistratosus** Berk. & Cooke 1876 : 384.
«Trail no 78 (Brazil)»
= *Rigidoporus vinctus* (Berk.) Ryv.

P. **blepharistoma**Berk. & Br. 1875 : 31.
«Glamis (Scotland) 1874.
= *Ceriporia viridans* (Berk. & Br.) Donk.

D. **bowmani** Berk. 1872 : 166.
«Australia» - *Trichaptum byssogenus* (Jungh.) Ryv. a resupinate specimen.

F. **brunneolus** Berk. & Curt. 1868 : 321.
«Cuba, Wright, no 327».
= *Echinochaete brachyporus* (Mont.) Ryv. as already indicated by Lowe on the sheet (as *P. megaloporus* Mont. non Pers).

P. **brunneo-pictus**Berk. 1856 : 176.
«In trucis putridis, Panuré (Brazil)».
= *Amauroderma schomburgkii* (Berk.) Torr.

F. **caespitosus** Berk. 1872 : 167.
«Clarence River (New. South Wales, Australia) Dr. Beckler».
= *Filoboletus manipularis* (Berk.) Singer teste Singer (1945 : 215).

P. **calceus** Berk. & Br. 1875 : 55.
«No 598, Dolosbaget, May 1868 (Sri Lanka)».
Nomen invalidum, non *P. calceus* Schw. 1832. The species was given a valid name as *Poria calcicolor* Sacc. & Syd. (Sacc. & Syd. 1899 : 192), and has since been transferred to *Theleporus*.
For a description, see Ryvarden & Johansen (1980 : 53).

P. **calcitratus** Berk. & Curt. 1868 : 314.
«Cuba, Wright no 816».
= *Phellinus calcitratus* (Berk. & Curt.) Ryv. For a description, see Ryvarden & Johansen (1980 : 142).

P. **calignosus** Berk. 1878 : 46.
«Malamon Island (Phillipines) 4 Feb. 1875 Challenger.»
= *Loweporus fusco-purpureus* (Pers.) Ryv.

P. **camerarius** Berk. 1856 : 143.
«Ad terram sylvanum, Panure Feb./53 o. 197»
= *Amauroderma camerarium* (Berk.) Furt. For a description, see Furtado (1981 : 35).

P. **campylus** Berk. 1860a : 52.
«Tasmania (Australia)».
= *Tyromyces campylus* (Berk.) Ryv. comb. nov. Basionym *Polyporus campylus* Berk. Flora Tasman. 2 : 252, 860.
For a description, see Cunningham (1965 : 92) who placed the species in *Grifola* because it frequently occurs in dense, imbricate clusters. However, *Grifola* should be restricted to distinctly stipitate and multpileate species growing on the ground.

P. **carbonaceus** Berk. & Curt. 1968 : 317.
«Cuba, C. Wright no 204».
= *Melanoporella carbonaceus* (Berk. & Curt.) Murr.

*P. carbonaceus*Berk. & Curt. is the type of *Melanoporella* Murr. and a description is found in Lowe (1966 : 166). The genus is accepted based on its dimitic system with simple septate, often slightly thickwalled, generative hyphae and coloured skeletal hyphae. Macroscopically it is very similar to *Nigroporus*, which, however, has clamped, thinwalled and hyaline generative hyphae and smaller spores, although the latter are cylindrical, thinwalled and non-amyloid as in *Melanoporella.*
Nigrofomes Murr. may also be a related genus, but its consistency is extremely hard and it is apparently monomitic with scattered cystidia.

H. **carbonaria** Berk. & Curt. in Berk. 1872 : 68.
= *Gloeophyllum carbonarium* (Berk. & Curt.) Ryv. comb. nov. Basionym: *Hexagonia carbonaria* Berk & Curt. Grevillea 1 : 68, 1872.
There is a description in Lowe (1966 : 170) and in Overholts (1953 : 152). The species has been placed in genera like *Trametes* and *Coriolellus* besides *Hexagonia*, but seems to be better placed in *Gloeophyllum* with which it shares the dimitic hyphal system with brown skeletal hyphae, hyaline, realativly large cylindrical spores and a brown rot. The deviating character is the lack of cystidia in the hymenium which are present in many *Gloeophyllum* species, but absent or weakly developed in species like *Gloeophyllum odoratum* (Fr.) Imaz.

P. **carneofulvus** Berk. in Fr. 1851 : 68.
= *Phellinus gilvus* (Schw.) Pat. teste Murrill 1904 : 418.

P. **carneo-pallens** Berk. 1856 : 235.
No 178, ad truncos putrides, Panuré, (Brazil).»
= *Rigidoporus vinctus* (Berk.) Ryv.

P. **cartilaginosus** Berk. & Br. 1873 : 49.
«No 605 (Sri Lanka)».
= *Nigroporus durus* (Jungh.) Ryv.

P. **cassiaecolor** Berk. 1856 : 171.
«No 189, Panuré (Brazil)».
= *Amauroderma schomburgkii* (Mont. & Berk.) Torr. Teste Furtado (1981 : 80).

P. **catervatus** Berk. 1855 : 180.
«New Zealand».
= *Tyromyces catervatus* (Berk.) Cunning. There is a good description in Cunningham (1965 : 123).

P. **cavernulosus** Berk. 1865 : 235.
«No 204. Ad ramos. Panuré (Brazil)».
= *Megasporoporia cavernulosa* (Berk.) Ryv. For a detailed description, see Ryvarden, Wright & Rajchenberg (1982 : 174).

P. **cerifluus** Berk. & Curt. in Berk. 1872 : 50.
«no 2926 Car. Inf. (Carolina, USA) Ravenel».
= *Tyromyces cerifluus* (Berk. & Curt.) Murr. For a description, see Lowe (1975 : 39) or Ryvarden (1978 : 458).

P. **cerebrinus** Berk. & Br. 1879b : 209.
«Glamis (Scotland) on fir.»
= Badly developed specimen and I am unable to determine it. The host suggests a young specimen of *Antrodia ramentacea.*Bresadola has noted on the sheet: «States anomalitus - myriodoporin».
The name should be dropped as a nomen ambigum.

H. **cesatii** Berk. in Cesati 1879 : 8.
«*Daedalea pruinosa* Lev. Sarawak».
= *Lenzites vespacea* (Pers.) Ryv.

P. **chromaticus** Berk. & Cook 1876 : 384.
«Brazil, Trail no 13».
= *Perenniporia medulla-panis* (Fr.) Donk

P. **chrysites** Berk. 1856 : 233.
«San Carlos, In sylvis Aug./53 (Brazil)». = *Phylloporia chrysita* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 232).

P. **chrysobaphus** Berk. & Curt. in Berk. 1872 : 53.
«Alabahma, Peters (USA), in abietem».
The species belongs in Corticiaceae s. lat. Bresadola has on the sheet noted «ne pas assez distincte de *Merulius pinastri* Fr.».Ginns (1978 : 1966) disagrees, but offers no clue to its identity. The species is unknown to me, but fairly characteristic with a weak poroid pattern and simple septate hyhae and pale yellow spores about 5-5,5 x 3,5-4 µm. Thus, it seems to represent a species in the *Coniophoraceae*, but is not mentioned in Ginns (1982) in his monograph of *Coniophora*.

P. **cirrhiferus** Berk. & Curt. 1868 : 314.
«Cuba, Curtis (Wright) no. 441.».
= *Coriolopsis caperata* (Berk.) Murr. as indicated on the sheet by D. Reid.

P. **citreus** Bewrk. 1872 : 162.
«Clarence River(New South Wales, Austrália) Dr. Beckler 1980».
= *Antrodiella citrea* (Berk.) Ryv. comb. nov. Basionym: *Polyporus citreus* Berk. J. Linn. Soc. Bot. 13 : 162, 1972.

Fruitbody effused reflexed with a narrow pileus, 1-2 cm wide, probably waxy when fresh, rather hard when dry. Pileus first citric yellow and smooth to finely velutinate from the base becoming agglutinated and dirty brown in narrow sulcate zones, pilei often partly imbricate to lobed. Pore surface pale citric yellow to white, distinctly more citric yellow along the sterile margin, pore round and small, almost invisible to the naked eye, 6-8 per mm, tubes up to 8 mm. deep.

Context dense and white, more citric yellow towards the substrate and margin, up to 3 mm thick.

Hyphal system dimitic, generative hyphae thin to distinctly thickwalled, and with clamps, 2-8 mm wide. Skeletal hyphae thickwalled to solid, unbranched 3-5 µm wide, cystidia none. Basidia clavate 8-10 x 3-4 µm with 4 sterigmata. Spores ellipsoid, thinwalled and IKI -, mostly collapsed, about 3 x 2 µm.

Specimen seen: Australia: Clarence river, Dr. Beckler, (Type), Mt. Wilson, Blue Mountains, R. Coveny 52/82 25.5.1982.

Cunninghams concept (1965 : 137) is not in accordance with the type and is based on a New Zealand taxon with binding hyphae and larger spores. This taxon will be treated in a later paper.

Antrodiella seems to be the appropriate genus with its dimitic hyphal system with skeletal hyphae, small spores and rather dense consistency.

H. **cladophora** Berk. 1877 : 47.
«Malamon Island (Indonesia). Feb. 4, 1875, Challenger».
= *Elmerina cladophora* (Berk.) Bres.

Fruitbody annual, pilate, spathulate to fanshaped, up to 5 cm long and wide, 3-6 mm thick, coriaceous when fresh, fragile when dry. Pileus white when fresh, fading to ochraceous or pale brown, first finely tomentose, soon more tufted to slightly hispid and with a distinct resinous pellicle or thin crust. In old specimens also the tufted hyphae become saturated with a resinous brown substance.

Pore surface first white, soon ochraceous to resinous brown, pores irregular, angular with wavy porewalls, in parts elongated radially to partly split, 1-3 mm wide and long. Pore walls densely covered with hyaline hyphal pegs. Trama and context cream-coloured to pale brown, dense and fragile, context up to 2 mm thick.

Hyphal system dimitic, generative hyphae probably with clamps, skeletal hyphae totally dominating, in the tufted tomentum up to 10 um wide in the clavate ends, otherwise mostly 2-4 µm wide. Context, trama and hyphal pegs consist of thickwalled skeletal hyphae 2-6 µm wide. Spores not observed.

The species is the type of *Elmerina* Bres. a genus which is related to *Favolus* Fr. but easily separated by the numerous hyphal pegs and the unbranched skeletal hyphae. Further, the distinct duplex consistency with a lower loose context and an upper hard and dense cuticle are also prominent characters of *Elmerina.*

P. **cladothrix** Berk. & Curt. 1868 : 309.
«Cuba, C. Wright no 205».
= *Trichaptum byssogenus* (Jungh.) Ryv. as already indicated by Lloyd (1917 : 703-04).

P. **clathratus** Berk. & Curt. in Berk. 1872 : 54.
«Lousiana, Dr. Hale».
= This is badly developed specimen and the name should be discarded as a nomen ambigum. Bresadola has on the sheet noted «Anormalitus». Only a few pores are developed and the type is completey sterile.

T. **cognatus** Berk. 1878 : 43.
«Aru Islands (Indonesia) Sep. 22. 1874, Challenger».
= *Coriolopsis cognatus* (Berk.) Ryv. comb. nov.
Basionym: *Trametes cognatus* Berk. J. Linn Soc. Bot. 16 : 43. 1878.

Fruitbody pileate, broadly attached to dimidiate, up to 3 cm wide and 2-4 mm thick, at the base, coriacous, Pileus zonate, cinnamon and with a soft cottony tomentum, often slightly tufted in places, in other places slightly agglutinated and with a smooth surface. Pore surface ochraceous to pale cinnamon with age, pores round to subangular, 7-8 per mm and almost invisible to the naked eye, tubes concolorous, up to 2 mm deep. Context distinctly duplex, lower part dense and pale cinnamon, no black line between the zones, but never the less easily separated in sections.

Hyphal system dimitic, generative hyphae with clamps, 2-4 µm wide, very difficult to find, skeletal hyphae yellowish, thickwalled and 3-6 µm wide. Cystidia none. Spores ellipsoid, thinwalled and hyaline 4,5-5 x 3 µm.

Besides the type, specimens have been examined from Malaysia: Pahang, Trembling, 19. Nov. 1930 E. Corner 24461 (K) and the type of *Polyporus turgidus,* Lloyd: Sarawak: Sandakan. Sept. 1920 Ramos M. 2099 (BPI).

The species is rather easy to recognize by its soft, cinnamon and duplex consistency, the small pores and the ellipsoid spores.

C. substuppeus (Berk.) Ryv. from Brazil is somewhat similar, but here the lower context becomes almost blackish and resinous with age, its colour is also dark cinnamon and the spores are larger.

T. **conchatus** Berk. 1878 : 47.
«Malanipa (Phillipine Islands) Challenger».
= *Trametes incana* Lev.

P. **collabefactus** Berk. & Br. 1875 : 31.
«Glamis (Scotland)».
= *Byssomerulius serpens* (Fr.) Parm. as noted by J.H. Ginns on the sheet.

L. **cookei** Berk. 1876 : 161.
«371, Sterling Center, N.Y. (New York, USA) Aug. & Oct».
= *Daedaleopsis confragosa* (Fr.) Schroet

H. **coriacea** Berk. & Cook 1876 : 386.
«Trail, Teffe (Brazil) no 134».
= *Perenniporia ochroleuca* (Berk.) Ryv.

P. **corrivalis** Berk. 1872 : 162.
The type has not been found.

P. **cratharellus** Berk. & Curt. 1868 : 305.
«Cuba, Wright, Curtis no 377».
= *Polyporus* cfr. *tricholoma* Mont. The same taxon was also described as *P.scabripes*, Berk. & Curt., see this species for comments.

P. **crociporus** Berk. & Curt. 1856 : 212.
«Bethelem (Pennsylvania, USA) in Salix, Herb, Schw.».
= *Caloporus spissus* (Schw.) Ryv. as already indicated by Lowe (1966 : 137).

P. **crocitinctus** Berk. & Curt. 1968 : 311.
«Cuba. C. Wright no 198».
= *Inonotus crocitinctus* (Berk. & Curt.) Ryv. There is a good description of the species by Gilbertson (1969 : 123-24) as *I. arizonicus* Gilb.

L. **cubensis** Berk. & Curt. 1868 : 303.
«Cuba, C. Wright».
= *Lenzites elegans* (fr.) Pat.

P. **cucullatus** Berk. & Curt. in Berk. 1872 : 51.
«New England, Sprague» (USA)
= *Inonotus radiatus* (Fr.) Karst. as already indicated by Bresadola at the sheet.

P. **cupulaeformis**Berk. & Curt in Berk. 1872 : 38.
«Car. Inf. (S. Carolja USA)».= *Porodisculus pendulus* (Schw.) Murr.

P. **cupreo-roseus** Berk. 1856 : 233.
«Spruce no 184 (Brazil)».
= *Trametes cupreo-rosea* (Berk.) Lloyd. For a description, see Fidalgo (1968 : 201).

F. **curtisii** Berk. 1872 : 68.
«335, Car. Inf. (S. Carolina, M.A. Curtis».= *Polyporus* cfr. *arcularis* Fr. as indicated by Lloyd (1912 : 176).

P. **decolor** Berk. 1856 : 195.
«No 47, in truncis putridis, Panuré (Brazil)».
= *Polyporus s. str.*

Fruitbody fanshaped, 3 cm wide and 2 cm from base to margin, up to 3 mm thick, woody hard. Pileus smooth, glabrous, reddish-brown, slightly darker towards the margin. Pores angular, thinwalled somewhat elongated close to the base, 4-5 per mm pore surface pale umber brown, tubes pale brown, up to 2 mm deep, Context cinnamon and 1-2 mm thick hyphal system dimitic, generative hyphae with clamps 2-3 µm wide, only a few fragments seen, fruitbody dominated by arboriform binding hyphae, solid to thickwalled, hyaline and faintly yellowish. Spores cylindrical, 6,5-7,5 x 2-3,0 µm. The species looks like a small and young specinem of *P. dictyopus*, but this species usually has a blackish base or stipe and distinctly smaller pores. It is separated from *P. varius* by a darker pileus and larger pores.

P. **deglubens** Berk. 1856 : 235.
«*deglubens* B. (Brazil)».
= *Trametes modesta* (Fr.) Ryv. a young specimen.

P. **delicatus** Berk. & Curt. in Berk. 1872 : 37.
«no 4512 Alabahma, Peters».
= *Spongipellis fractipes* (Berk. & Curt.) Kotl. & Pouz.

P. **detritius** Berk. 1856 : 197.
«Spruce no 43 (Brazil)».
= *Perenniporia detritius* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 467).

T. **devexa.** 1872 : 165.
«Tweed (New South Wales, Australia) Guilfoyle»..
= *Coriolopsis polyzona* (Pers.) Ryv. as indicated on the sheet both of Bresadola and D. Reid.

P. **diabolicus** Berk. 1856 : 174.
«Spruce no 195 (Brazil)».
= Accepted species in *Polyporus* s. str. There is a description in Ryvarden & Johansen (1980 : 489).

T. **dibapha** Berk. 1879 : 32.
«Rio de Janeireo (Brazil)».
= *Coriolopsis caperata* (Berk.) Murr. as already indicated by Reid on the sheet.

P. **dibaphus** Berk. & Curt. in Berk. 1872 : 4.
«Alabama (USA) Peters, on Ilex opaca».
= *Polyporus badius.* (Gray) Schw.

P. **dickensii** Berk. 1878 : 50.
«Japan, J.V. Dickens».
= *Bondartzewia berkleyii* (Fr.) Bond. & Sing.

P. **diffisus** Berk. 1855 : 180.
The type has not been found.

P. **discoideus** Berk. & Curt. 1867 : 305.
«Cuba, Curtis (Wright) *79*».
= *Polyporus udus* Jungh.

P. **dissitis** Berk. & Br. 1873 : 48.
«No 966, Central Province (Sri Lanka) Dec. 1868».
= *Bjerkandera adusta* (Fr.) Karst. as already noted by Bresadola on the herbarium sheet

P. **diversiformis** Berk. & Br. 1873 : 53.
«No 535, Central Province (Sri Lanka) Dec. 1867». selected lecotype.
= *Oxyporus cervino-gilvus* (Jungh.) Ryv.

P. **dochmius**Berk. & Br. 1873 : 50.
«No 970, Cent. province Dec. 1868 (Sri Lanka)».
= *Fomitopsis dochmius* (Berk. & Br.) Ryv. For a description, see Ryvarden & Johansen (1980 : 338).

P. **dorcadideus** Berk. & Br. (1883 : 57).
«(Australia)».
= *Echinochaete brachyporus* (Mont.) Ryv. as already indicated by D. Reid (1963 : 285).

P. **dryinus** Berk. & Cooke in Cooke 1878 : 130.
«In oak, Aikin, S.C. (South Carolina, USA)» H.W. Ravenel 171».
= *Perenniporia medulla-panis* (Fr.) Donk as already indicated by Lowe (1966 : 107).

H. **durissima** Berk. & Br. 1873 : 57.
«No 972, Central province (Sri Lanka) Dec. 1868».
= *D. sulcata* (Berk.) Ryv.

P. **ectypus**Berk. & Curt. in Berk. 1872 : 52.
«Car. Inf. (South Carolina) Ravenel 2942».
= *Trametes ectypus* (Berk. & Curt.) Ryv. For a description, see Overholts (1953 : 372).

P. **ellisii** Berk. in Cooke & Ellis 1878b : 4.
«Newfield 873 Ellis, 14. Oct. 1872. New Jersey (USA)».
= *Albatrellus ellisii* (Berk.) Kotl. & Pouz.

P. **endapalus** Berk. 1872 : 163.
«Australia, Tweed River, Dr. Guilfoyle».
= *Loweporus roseo-albus* (Jungh.) Ryv. as already indicated on the sheet by Bresadola.

P. **endothrix** Berk. 1856 : 197.
On the pole of my orchard at St. Carlos (Brazil)».
= *Tripchaptum perrottettii* (Lév.) Ryv. as already indicated on the sheet by Bresadola.

P. **epilinteus** Berk. & Br. 1873 : 55.
«No 605 (Sri Lanka)», selected as type by Lowe in herb. and accepted here.
= *Rigidoporus lineatus* (Pers.) Ryv.

P. **epimiltinus** Berk. & Br. 1873 : 54.
«Ceylon, G.H.K. T. Nov. 1867».
= *Tinctoporellus epimiltinus* (Berk. & Br.) Ryv.
For a description, see Ryvarden & Johansen (1980 : 554).

T. **epitephra** Berk. 1872 : 165.
«Australia».
= *Dichomitus epitephrus* (Berk.) Ryv. comb. nov. Basionym: *Trametes epitephra* Berk. J. Linn. Soc. Bot. 13 : 165, 1872.
There is a good description in Cunningham (1965 : 132) even if the spores are measured to 11-15 x 6-9 um.

P. **eriophorus** Berk. & Br. 1883 : 60.
«Brisbane (Australia) on pine sticks. Bailey no 419».
= *Byssomerulius corium* (Fr.) Parm. as already indicated on the sheet by Cunningham.

H. **erubescens** Berk. 1856 : 237.
No 40, in truncos Panuré (Brazil)».
= *Daedalea sprucei* Berk.

P. **eurocephalus** Berk. & Br. 1873 : 48.
«No 969 (Sri Lanka)».
= *Bondartzewia berkleyii* (Fr.) Sing.

P. **evolutus** Berk. & Curt. 1868 : 308.
«Cuba (Curtis Wright) no 459».
= *Rigidoporus microporus* (Fr.) Overeem.

P. **evolvens** Berk. 1856 : 235.
«No 214, San Carlos, del Rio Negro, Mar./ 53 (Brazil)».
= *Trichaptum biformis* (Fr.in Kl.) Ryv. The type is small, semiresupinate and sterile, However, its hyphal structure is consistent with that of *T. biformis.*

P. **excurrens** Berk. & Curt. 1868 : 318.
«391, Cuba, Curtis».
= *Coriolopsis floccosa* (Jungh.) Ryv. a subresupinate form as already indicated by Bresadola on the herbarium-sheet.

P. **exilis** Berk. 1856 : 172.
Spruce no 31. Brazil».
= *Amauroderma exile* (Berk.) Torr. For a description, see Furtado (1981 : 44).

P. **exothephrus** Berk. 1878 : 9.
«Admirality Islands (Indian Ocean) March 1875, Challenger».
= *Loweporus roseo-albus* (Jungh.) Ryv.

P. **fatiscens** Berk. & Rav. in Fung. Carol. Fasc. 2, no 21, 1853.
«Ravenel, Inf. Carol. (S. Carolina) Exsc. Dawatt 3/75».
= *Caloporus tardus* (Berk.) Ryv. For a description, see Lowe (1966 : 32).

P. **favillaceus** Berk. & Curt. in Berk. 1872 : 53.
«New England, Spargue (USA)».
= *Trichaptum abietinum* (Fr.) Ryv. as already indicated by Lowe (1966 : 134).

P. **fendzleri** Berk. & Curt. 1868 : 317.
Cuba, Curtis (Wright) no 389».
= *Aporpium caryae* (Schw.) Teix. & Rog.

P. **fissilis** Berk. & Curt. in Berk. 1872 : 50.
«No 1445, South Carolina (USA)».
= *Tyromyces fissilis* (Berk. & Curt.) Donk. For a description, see Lowe (1975 : 17-18).

H. **flabelliformis** Berk. 1878 : 47.
«Malamon Islands, 30. Jan. 1875 Challenger».
= *Elmerina cladophora* (Berk.) Bres.

P. **focicola** Berk. & Curt. 1868 : 305.
«Pol. connatus Schw. Cuba, Curtis (Wright) no 386 - focicola B. & C (The latter in pencil by Wakefield).
= The type is seemingly a young specimen of *Coltricia perennis* and not the taxon described by f. example Overholts (1953 : 389). The latter has distinctly cylindrical to very oblong ellipsoid spores 8,5-12 x 4-5 µm while they in the type of *P. focicola* are only 7,5-6 x 4-4,5 µm, thus, within the range of *C. perennis.* The spores of type of *P. focicola* are also slightly tinted yellow which should indicate that they at least are partly ripe. In North America there are in this complex, some embarassing intermediate forms between *P. perennis* and *P. focicola* sensu Overholts.

P. **foedatus** Berk. 1878 : 41.
«Cape York (Queensland, Australia) Sept. 1-8 1974 Challenger».
= *Trametes feei* (Fr.) Pat.

P. **fractipes** Berk. & Curt. in Berk. 1872 : 39.
«Var. Inf. (S. Carolina, (USA) Ravenel 2858».
= *Spongipellis fractipes* (Berk. & Curt.) Kotlaba & Pouzar.
For a description, see Kotlaba & Pouzar 1976 : 120).

P. **fruticum** Berk. & Curt. 1868 : 310.
«Cuba, Wright no 442».
= *Phylloporia frutica* (Berk. & Curt.) Ryv. For a description, see Ryvarden & Johansen (1980 : 233).

P. **fullageri** Berk. 1878 : 54.
Type not found (Lord Howe Island, Australia).

P. **fuligo** Berk. & Br. 1873 : 53.
«No 967 Peradenyia, Dec. 1868 (Sri Lanka)».
= *Grammothele fuligo* (Berk. & Br.) Ryv. For a description, see Ryvarden & Johansen (1980 : 39).

P. **fulvitinctus** Berk. & Curt. 1868 : 313.
«Cuba, C. Wright. no. 136».
= *Trametes nivosa* (Berk.) Murr.

Lowe (1975 : 64) accepts *P. fulvitinctus* as a species of its own. However, a comparison between the characters used to separate *P. nivosus* and *P. fulvitinctus* in his key, reveals that only the pores are given as slightly smaller in *P. fulvitinctus* (8-9 per mm) than in *P. nivosus* (6-8 per mm) while the spores are similar. I have only seen the type of *P. fulvitinvtus*, but many specimens of *P. nivosus* may have a more varied colour than described by Lowe.

It is typical for species in this complex that they very often are fertile while other trimitic species are usually found in a sterile condition. Other species in this complex are *P. palustris* Berk. and *Tyromyces nivosellus* Murr both of which have spores within the range given for *Trametes nivosus* (Berk.) Murr.

P. **fusco-lineatus** Berk. & Br. 1879a : 401.
«Brisbane (Australia) no 80, J. Bailey».
= *Polyporus grammocephalus* Berk.

P. **gallinaceus**Berk. & Cooke 1878 : 379.
«Rio Puras (Brazil) Trail no 83».
= *Microporellus obovatus* (Jungh.) Ryv.

P. **gallopavonis** Berk. & Br. 1883 : 59.
«No 139, Brisbane (Australia).
= *Trametes menziesii* (Berk.) Ryv.

D. **glaberrima** Berk. & Curt. in Berk. 1872 : 67.
«Sante River (N. Caroliona, USA) no 1032.
= *Lenzites elegans* (Fr.) Pat.

D. **glabrescens** Berk. 1878 : 39.
«Parmatta (Australia) Challenger».
= *Lenzites vespacea* (Pers.) Ryv. as already noted by Bresadola on the sheet.

P. **glaziovii** Berk. 1879 : 34.
«Brazil, Glaziou no 9167».
= *Amauroderma schomburgkii* (Mont. & Berk.) Torr. as already indicated by Furtado (1981 : 80).

P. **gordoniensis** Berk. & Br. 1865 : 319.
«Aboyne 1862 (Scotland).
= *Trechispora mollusca* (Fr.) Lib. as noted by several authors on the sheet.

P. **gourliaei** Berk. 1860a : 253.
«From William Gourlii, June V.D.Land (Tasmania, Australia)».
= *Trametes hirsuta* (Fr.) Pil. as indicated by D. Reid on the sheet. Bresadola according to notes in the same place believed it to be a specimen of *Coriolopsis polyzona (P. occidentalis).*

H. **gracilis** Berk. 1856 : 237.
«Spruce no 7, Brazil».
= *Amauroderma calcigenum* (Berk.) Torr. as indicated by Furtado (1981 : 31).

P. **guilfoylei** Berk. & Br. 1883 : 58.
«Tweed River, N.S. Wales (Australia) Guilfoyle no 71».
= *P. elegans* Fr. as already indicated by Bresadola on the sheet.

P. **gunnii** Berk. 1860a : 253.
«Tasmania (Australia)».
= *Tyromyces campylus* (Berk.) Ryv. as already indicated by Cunningham (1965 : 92).

P. **havannensis** Berk. & Curt. 1868 : 310.
«Cuba, C. Wright, no 133».
= *Trametes* cfr. *marianna* (Pers.) Ryv. the type is sterile and its identity is difficult to ascertain. In macromorphology and in hyphal system it is in accordance with *T. marianna*.

P. **headinus** Berk. 1856 : 234.
«No 38, Ad truncoc putrides, Panuré (Brazil)».
= *Trametes pavonia* (Hook.) Ryv.

P. **hemibaphus** Berk. 1856 : 194.
«Panuré, Brazil, Spruce».
= *Humhreya coffeatum* (Berk.) Stey. as indicated by Furtado (1967 : 383).

P. **hemicapnoides** Berk. & Br. 1873 : 47.
«No 600, Dolesbagey, May 1868 (Sri Lanka)».
Accepted species in *Polyporus* s. str. For a description, see Ryvarden & Johansen (1980 : 497).

P. **hemileucus** Berk. & Curt. 1868 : 312.
«Cuba, C. Wright, no 167».
= *Fomitopsis supina* (Fr.) Ryv. as indicated by Bresadola on the herbarium sheet.

P. **hemitephrus** Berk. 1855 : 179.
«New Z. Colenso».
= *Fomitopsis hemitephrus* (Berk.) Cunningh.
There is a good description in Cunningham (1965 : 147).

P. **hibernicus** Berk. & Br. 1871 : 428.
«Luggela, country Wicklow, on Pinus (Ireland)».
= *Tyromyces hibernicus* (Berk. & Br.) Ryv. For a description, see Ryvarden (1978 : 468).

P. **hinnuleus** Berk. & Cooke 1876 : 378.
«Trail no 11 (Brazil)».
= *Inonotus splitbergeri* (Mont.) Ryv. as already noted by Bresadola on the sheet.

F. **hispidulus** Berk. & Curt. 1868 : 321.
«Cuba, C. Wright no 218».
= *Favolus brasilensis* (Fr.) a young specimen with typical bristles or scattered hairs along the contracted base.

T. **hispidula** Berk. & Curt. 1868 : 319.
«Cuba. C. Wright. no 157».
= *Coriolopsis* sp. a young and badly developed specimen. Bresadola has on the sheet suggested a synonmy with *C. polyzona* (Pers.) (Ryv.) but the type of *T. hispidula* is seemingly far too hard to be that species which is more coriaceous. The hyphal system is trimitic with coloured or tinted skeletal hyphae, but no hymenium is developed.

D. **hobsoni** Berk. 1872 : 165.
«Bombay (India) F.G. Hobson».
= *Lenzites acuta* Berk.

343 line 36 for *Echinopora hydnophorus* read *Echinoporia hydnophora*

P. holotephrus Berk. & Curt. 1868 : 315.
«Cuba, Curtis (Wright) no 352».

Fruitbody dimidate, about 4 cm wide and 1-1,5 mm thick, rather hard. Pileus blackish, dull and faintly zonate, to the naked eye apparently glabrous, but covered with short bundles of dark brown hairs on a black thin cortex the surface reminding of that found in *Ischnoderma resinosum*. Pore surface dark brown today, pore invisible to the naked eye, 7-9 per mm, very shallow and sterile. Above them there is a dark zone as if soaked with some resinous substance and this zone intergrades with a light brown and looser context above which there is a thin dark cortex.

Hyphal system dimitic, generative hyphae with clamps, only fragments seen, 2-3,5 µm in diameter, skeletal hyphae thickwalled but with a wide and variable lumen, the width of the hyphae varying considerably, 3-10 µm wide. No hymenial elements were observed.

Macroscopically the specimen reminds of a very thin flabellate and immature specimen of *Polyporus dictyopus* Mont, a very common and variable species in the tropics. This the more so as the type has at its base a very fine layer of dark brown tomentum reminding of that seen in *Polyporus* s.str.

However, the hyphal system with total dominance of skeletal hyphae and no binding hyphae, is not as in *Polyporus* s. str. Furthermore, the dense dark zone above the tubes is also unknown in *Polyporus* s. str. although this zone may be a result of some chemical treatment as also the porewalls give the impression of being soaked with some dark substance.

For the time being the species has to be left without a proper identification.

P. hyalinus Berk. 1860a : 255.
«Tasmania (Australia)».
= *Tyromyces merulinus* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 605).

P. hybridus Berk. 1860b : XVII.
«Boletus hybridus Sow. (England)».
= *Antrodia vaillantii* (Fr.) Ryv. as already indicated by J. Lowe and D. Reid on the sheet.

P. hydniceps Berk. & Curt. 1868 : 305.
«Cuba, Curtis (Wright) no 354».
= *Polyporus dictyopus* Mont. a badly developed specimen.

P. hydnophorus Berk. & Br. 1873 : 54.
«367. Pol. fulvus Fr. var. Ceylon, G.H.K.T.».
= *Echinopora hydnophorus* (Berk. & Br.) Ryv.
For a description, see Ryvarden & Johansen (1980 : 326).

P. hydnoporus Berk. 1879 : 31.
«Rio de Janeiro (Brazil) Glaziou no 8525».
= *Grammothele lineata* Berk. & Curt. as indicated already by Lowe (1964 : 31).

P. hydrophilus Berk. & Curt. 1868 : 306.
«Cuba, Wright no 353».
= *Androdiella hydrophila* (Berk. & Curt.) Ryv. comb. nov.
Basionym: *Polyporus hydrophilus* Berk. & Curt. J. Linn. Soc. Bot. 10 : 306, 1868.
The species is characterized by a dense fruitbody with small pores, a dimitic system and tiny spores (2-3 x 1,5-2 um). *A. semisupina* (Berk. & Curt.) Ryv. the type of *Antrodiella*, has a homogeneous and white context and longer spores. For a detailed description of *A. hydrophila*, see Lowe (1975 : 46) or Ginns (1980 : 1583).

P. **hymenocystis** Berk. & Br. 1879b : 210.
«Rev. J. Stevenson, Glamis (Scotland)».
= *Trechispora mollusca* (Fr.) Lib.

P. **hypocitrinus** Berk. 1876 : 50.
«Bahia (Brazil) Challenger».
= *Tyromyces hypocitrinus* (Berk.) Ryv. comb. nov. Basionym: *Polyporus hypocitrinus* Ber. J. Linn. Soc. Bot. 15 : 50, 1876.

Fruitbody dimidiate and applanate, about 8 x 10 mm. Pileus smooth to slightly wrinkled radially dark ochraceous. Pore surface sandcoloured to ochraceous, Pores angular, about 4-6 per mm, tubes up to 3 mm deep. Context homogeneous, cream to pale ochraceous, about 1 mm thick.

Hyphal system monomitic, generative hyphae with clamps and 2-4 um in diameter, gloeocystidia present, as clavate to slightly pointed, 12-20 x 5-8 µm and pale yellow. Spores allantoid, smooth, thinwalled and hyaline, 4-5 x 1-1,5 µm. Known only from Bahia in Brazil.

As pointed out by Lowe (1975 : 31) this species comes very close to *T. leucomallus* Murr. from North America and but more collections are needed before a synonmy can be established. Berkeleys name will eventually be the prior one.

P. **hypoplastus**Berk. 1856 : 174.
«In truco putrido, Panuré no 53 (Brazil)».

The type is completely sterile and the pores are very badly developed. As pointed out by Furtado (1968 : 337) it is probably a species of the Ganodermataceae. Without spores, its status must remain a nomen ambigum. In the Kew Herbarium there is a collection named *P. hypoplastus* from Bolivia (Singer 2005B) determined by D. Reid. This collection is seemingly of *Amauroderma leptopus* (Pers.) Torr. with a typical laccate pileus. If this interpretation is correct, Berkleys name becomes a synonym of this species.

P. **incrustans** Berk. & Curt. in Berk. 1872 : 54.
«New Engl. (USA) Murrey».
Nomen invalidum, not *Polyporus incrustans* Pers. Mycol. Europ. 2 : 93, 1825.

Murrill (1919 : 232) was aware of the name problem and proposed *Poria humilis*unecessary as Berkeley and Curtis name had been validated by Saccaodo when he transferred the species to *Poria.* There is a good description of this taxon (sub. *Poria humilis* in Lowe (1966 : 127). The species has a dimitic hyphal system with clamped generative hyphae and hyaline thinwalled and non-amyloid spores. This together with a white to cream fruitbody clearly indicates *Antrodiella* as the proper genus which include species with such microscopical characters.

Antrodiella incrustans (Berk. & Curt. ex Cooke.) Ryv. comb. nov. Basionym: *Poria incrustans* Berk. & Curt. ex Cooke, Grevillea 14 : 114, 1886.

P. **induratus** Berk. in Melliss 1875 : 380.
«St. Helena».
= *Antrodiella induratus* (Berk.) Ryv. comb. nov. Basionym *Polyporus induratus* Berk. in J.C. Melliss: St. Helena, p. 380, 1875.

Fruitbody pileate, broadly attached, 1 cm long and 6 mm wide partly imbricate and triquetrous in section with a rounded pileus. First soft, then hard and dense. Pileus first covered with a whitish to cream tomentum which has been weathered away and today present only as fine tufts of hyphae (lens), the pileus today blackish and dull and with an indurated black resinous zone. Margin sharp. Pore surface deep ochracous, indurated, pores small and isodiametric, 6-7 per mm. Tubes up to 4 mm deep and concolorous.

Context dense and homogenous, up to 5 mm thick and with a black zone on top.

Hyphal system dimitic, generative hyphae with clamps, 2-3 um wide, seen only in fragments. Skeletal hyphae thickwalled to almost solid, hyaline, 3-5 um in diameter, very weakly amyloid when observed in agglutinated masses. Cystidia not seen. Spores ellipsoid, hyaline, thinwalled and IKI-negative, 3,5-4,5 x 2-2,5 um. Only known from the type locality.

The type reminds slightly of *A. semisupina*, but is indurated with a black cuticle, a feature not known from any *Antrodiella* species. The microscopical characters are almost as in *A. semisupina* except for the weak amyloid reaction of the skeletal hyphae.

P. **ilicincola** Berk. & Curt. in Berk. 1872 : 52.
«Alabama, legit. Peters, ad cort. Ilicis opacae».
= *Trichaptum biformis* (Fr.) Ryv.

D. **incompta** Berk. in Berk. & Br. 1883 : 61.
«J.M.Bailey (Australia)».
= *Cerrena meyenii* (Kl.) Hansen as already indicated on the sheet by D.A. Reid.

P. **incrassatus** Berk. 1878 : 41.
Sommerset, Cape York (Australia). Challenger».
= *Ganoderma applanatum* (Fr.) Karst. as already indicated on the sheet by Bresadola.

P. **inflexibilis** Berk. 1856 : 199.
«Spruce no 52 (Brazil)».
= *Loweporus inflexibilis* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 413).

P. **intercalaris** Berk. & Cooke 1876 : 380.
«Trail no 77, (Brazil)»
= *Trametes* sp. sterile and badly developed, could be a weathered specimen of *T. hirsuta* (Fr.) Pil.

D. **intermedia** Berk. 1881 : 385.
«Australia».
= *Lenzites vespacea* (Pers.) Ryv as already stated by Cunningham on the sheet.

P. **interruptus** Berk. & Br. 1873 : 55.
«652, Ceylon (Sri Lanka)».
= *Ceriporia xylostromatoides* (Berk.) Ryv.

P. **intonsus** Berk. 1860a : 252.
The type has not been found.

P. **intybaceus** Berk. 1842 non Fr. 1821.
«Phillipines».
= *Cyclomyces setiporus* (Berk.) Pat.

L. **japonica** Berk. & Curt. 1860 : 121.
«Hakodai, Japan». U.S.S.E.».
= *Lenzites betulina* (Fr.) Fr. as already indicated on the sheet by Bresadola.

P. **keithii** Berk. & Br. 1875 : 30.
«Forres (Moray, Scotland)».
= *Tyromyces fragilis* (Fr.) Donk as already noted on the sheet by Kotlaba and Pouzar.

P. **kermes** Berk. & Br. 1873 : 49.
«Ceylon (Sri Lanka)».
= *Pyrofomes albo-marginatus* (Lév.) Ryv. as indicated by Bresadola on the sheet.

P. **laeticolor** Berk. 1878 : 46.
«Malamon Island (Phillipine) 4. Feb. 1875, Challenger».
= *Pyrofomes albo-marginatus* (Lév.) Ryv. as already noted on the sheet by Bresadola.

P. **lenzitoides** Berk. 1879 : 34.
«Rio de Janeiro (Brazil) Glaziou».
= *Favolus brasilensis* (Fr.) Fr.

P. **leptodermus**Berk. & Br. 1873 : 54.
«No 1033, Central Prov. (Sri Lanka) Jan 1869».
= *Ceriporia leptoderma* (Berk. & Br.) Ryv. For a description, see Ryvarden & Johansen (1980 : 270).

P. **leucomallus** Berk. & Curt. 1868 : 308.
«Cuba, Wright 104».
= *Tyromyces leucomallus* (Berk. & Curt.) Murr. For a description, see Lowe (1975 : 42).

P. **leucoplacus** Berk. 1855 : 180.
«New Zealand, Colenso».
= *Dichomitus leucoplacus* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 311).

P. **libum** Berk. 1872 : 163.
«Tweed (Australia) Guilfoyle (new S. Wales).
= *Polyporus grammocephalus* Berk. as indicated by Cunningham (1965 : 136).

T. **limitata**Berk. & Curt. in Berk. 1872 : 66.
«N. Mexico (USA), Dr. Biegelow».
= *Rigidoporus microporus* (Fr.) Overeem.

P. **limitatus** Berk. & Curt. in Berk. 1872 : 54.
«Car. Inf. (S. Carolina, USA)».
= *Perenniporia medulla-panis* (Fr.) Donk as indicated by Lowe (1966 : 107).

P. **lindbladii** Berk. 1872 : 54.
«Suec. Westm. (Sweden, Vestmannaland) Maj, Leg. Lindblad».
= *Antrodia lindbladii* (Berk.) Ryv. For a description, see Ryvarden (1976 : 82).

P. **lindheimeri** Berk. & Curt. in Berk. 1872 : 50.
«Texas, Lindheimer, on Sassafrass, no 3639.
= *Bjerkandera adusta* (Fr.) Karst.

P. **lindheimeri** Berk. & Curt. in Berk. 1872 : 50.
«Texas, Lindheimer, on Sassafrass, no 3639.
= *Bjerkandera adusta* (Fr.) Karst.

P. **lineato-scaber** Berk. & Br. 1883 : 59.
«Type (pencil, Lloyds hand) (Australia) .
= *Coriolopsis asper* (Jungh.) Teng.

P. **linteus** Berk. & Curt. 1860 : 122.
«Nicaragua, US Expl. Exped».
= *Phellinus linteus* (Berk. & Curt.) Teng. For a description, see Lowe (1957 : 35) or Ryvarden & Johansen (1980 : 180).

P. **luridus** Berk. & Curt. in Berk. 1872 : 37.
«Connecticut. Coll. Wright M.A.C».
= *Polyporus* cfr. *brumalis* Fr. The type is very small and immature, but belongs in *Polyporus* s. str.

P. **luteo-nitidus** Berk. 1856 : 175.
«Panuré (Brazil)».
= *Coltricia spathulatus* (Hook.) Murr.

P. **luteo-olivaceus** Berk. & Br. 1879 : 402.
«Brisbane (Australia) C.E. Broome».
= *Coriolopsis strumosa* (Fr.) Ryv.

P. **macer** Berk. 1856 : 176.
«Panuré, (Brazil)».
= *Amauroderma exile* (Berk.) Torr., as indicated by Furtado (1981 : 43).

T. **malicola** Berk. & Curt. 1856 : 209.
«Bethelem (Pennsylvania, USA) Herb. Schw.». = *Antrodia malicola* (Berk. & Curt.) Donk.
For a description, see Overholts (1953 : 150).

P. **marasmioides**Berk. 1856 : 173.
«Spruce no 73, Brazil».
= *Amauroderma exile* (Berk.) Torr. as indicated by Furtado (1981 : 43).

P. **marmoratus** Berk. & Curt. 1860 : 122.
«Nicaragua US Expl. Exped».
= *Fomes fasciatus* (Fr.) Cooke as already noted by Kotlaba and Pouzar on the herbarium sheet.

P. **martius** Berk. 1856 : 198.
«Panuré, Brazil».
= *Perenniporia martius* (Berk.) Ryv. For a description, see Ryvarden & Johansen (1980 : 469).

P. **meleagris** Berk. 1878 : 42.
«Aru Islands (Indonesia) Sep. 1874, Challenger».
= *Trametes menziesii* (Berk.) Ryv.

P. **melleus** Berk. & Br. 1873 : 53.
«No 133, Central Prov. (Sri Lanka) Feb. 1869».
= *Ceriporia mellea* (Berk. & Br.) Ryv. For a description, see Ryvarden & Johansen (1980 : 2729.

P. **merulinus** Berk. 1860 : 254.
«Tasmania (Asutralia)».
= *Tyromyces merulinus* (Berk.) Cunn. For a description, see Cunningham (1965 : 138).

T. **mexicana** Berk. 1867 : 423.
«Mexico, prope Orizaban, Botleri».
The type is badly eaten by insects and glued on to the sheet. Its hyphal system is trimitic with coloured skeletal hyphae and it is apparently a *Coriolopsis* species. For the time being, I am unable to give a clue to its identity.

P. **microstomus** Berk. & Curt. 1868 : 309.
«Cuba, C. Wright, no 138 (in the original as 128).
= *Rigidoporus lineatus* (Pers.) Ryv.

T. **moselei** Berk. 1878 : 40.
Tongatabui Island (Pacific) July 1874, Mr. Mosley».
= *Trametes scabrosa* (Pers.) Cunningh. as already indicated on the sheet by Bresadola.

T. **muelleri** Berk. & Curt. 1868 : 320.
«Victoria River (Australia)».
= *Trametes marianna* (Pers.) Ryv. as indicated on the herbarium sheet by Bresadola.

H. **muelleri** Berk. 1872 : 166.
«New England (Australia)».
= *Hexagonia tenuis* (Hook.) Fr.

P. **nebulosus** Berk. & Curt. 1868 : 317.
«Cuba, Curtis (Wright) no 444».
= *Rigidoporus sanguinolentus* (Fr.) Donk. as already indicated by Lowe in a note on the herbarium sheet.

P. **nephridius** Berk. 1856 : 195.
«Panuré, no 164 (Brazil)».
= *Polyporus blanchetianus* Berk. & Mont.

P. **nicaraguensis** Berk. & Curt. 1860 : 122.
The type has not been found.

P. **niphodes** Berk. & Br.1873 : 55.
«No 625, South of the island (Sri Lanka) July 1868».
= *Tyromyces* sp. a complete sterile specimen. It has a momomitic hyphal system with clamped generative hyphae, the resupinante pore surface is cream and the pores are 4-5 per mm, in parts larger. Its identity is unknown until a fertile specimen has been collected.

P. **nitidulus** Berk. & Curt. 1860 : 122.
«Bonin (Japan).»
= *Tyromyses* sp.? The type is badly contaminated and in a generally bad condition probably because of chemical treatment. The hyphal structure is difficult to ascertain and the name should be regarded as a nomen ambigum.

P. **nivosus** Berk. 1856 : 196.
«No 192, Panuré, (Brazil) Feb./53.»
= *Trametes nivosa* (Berk.) Murr. For a description, see Ryvarden & Johansen (1980 : 579).

P. **novae-angliae** Berk. & Curt. in Berk. 1872 : 51.
«Nov. ang. (USA) Sprague».
= *Trametes* sp.

The fruitbody is today pale cinnamon and reminds on sight of a small *Inonotus* sp. Murrill (1907-08 : 103) stated it to be a synonym of *Phellinus igniarius,* obviously without checking the microstructure relying only on the cinnamon colour. Overholts (1953) did not mention the name at all even if the type came from the New England States. Lowe (1957) assumed it to be a tropical species and that the type locality was wrongly cited. He did not know of any species of this kind from United States and he found hyphomycete spores of the kind one often finds in tropical specimens. Niemelä (1974) commented on the species in his study of *Phellinus tremulae* as Shope (1931) also had given *P. nova-angliae* as a synonym of *Phellinus tremulae*. Niemelä concluded that it had no connection with *Phellinus* and Hymenochaetaceae as clamps were present on the generative hyphae and he suggested that it could represent a poroid specmen of a *Gloeophyllum* species.

However, a microscopical examination of the trama and the context revealed a presence of both skeletal hyphae which dominated and twisted binding hyphae which swelled in 3% KOH, a typical feature in old *Trametes* sp. Furthermore, the skeletal hyphae are only weakly tinted in KOH, not rusty brown as in *Gloeophyllum* and I believe that the type represent a *Trametes* sp. such as *T. pubescens*. Old specimens of *Trametes* may assume brownish colours with age or the specimen may have been treated with some chemical. Some of the *Trametes* specimens in the Kew herbarium that were sent from Fries to

Berkeley are today so dark that one would believe they belonged to a *Coriolopsis* species. However, in a microscopical preparation, the skeletal hyphae are only weakly tinted and seemingly it is the interhyphal material that is responsible for most of the colour and not the hyphae as in *Gloeophyllum*, *Phellinus* and other genera with truly brown fruitbodies. In a preparation of the tubes from the type of *P. nova-angliae* there are some scattered collapsed and twisted spores which were up to 7 um long. They may be a contamination, but they may also support the *Trametes*-theory because they are within the range of the spores in *T. pubescens* although the width could not be measured properly. No cystidia like those of *Gloeophyllum* were observed.
Above it has been assumed that the type locality has been correctly cited. If some mistake has crept in on this point, Lowe may be right and we are left with many possibilities in the *Coriolopsis* group.

T. **ocellata** Berk. & Curt. 1868 : 319.
«Cuba, Wright (Curtis) no 440».
= *Hexagonia hydnoides* (Fr.) Fidalgo.

P. **ocellatus** Berk. 1856 : 172.
«No 192, ad terram in Caatingas (Brazil), Panuré, Feb./53».
= *Amauroderma schomburgkii* (Mont. & Berk.) Torr. Teste Furtado (1981 : 80).

P. **ochrotinctus** Berk. & Curt. 1860 : 122.
«Bonin (Japan) US. Expl. Exped».
= *Trametes* cfr. *marianna* (Pers.) Ryv. The pileus is partly covered by glued paper and the whole collection is small and badly developed. It is also sterile, but trimitic as in *T. marianna.*

T. **ohioensis** Berk. 1872 : 66.
= «Waynesville, Lea» (Ohio, USA)
= *Perenniporia ohioensis* (Berk.) Ryv. The species is closely related to *P. ochroleuca* and is mainly separated by much smaller pores. Cultural studies may, however, ultimately prove that the two species are synonymous. In many tropical species, the pore size is much more variable than seen in most boreal species.

P. **olivaceo-fuscus**Berk. & Br. 1873 : 46.
«No 826, Kandy (Sri Lanka) Oct. 1868».
= *Boletus* sp. as already indicated by Lowe on the herbarium sheet.

P. **omphalodes** Berk. 1856 : 172.
«No 32. Spruce, Amazonas (Brazil)».
= *Amauroderma omphalodes* (Berk.) Torr. For a description, see Furtado (1981 : 62

P. **ostreiformis** Berk. 1878 : 46.
«Challenger, 1878, Malamon Isl. (Phillipine Islands)».
= *Bjerkandera fumosa* (Fr.) Karst.

P. **oxydatus** Berk. & Curt. 1868 : 317.
«Cuba, Wright (Curtis) no 390».
= *Rigidoporus sanguinolentus* (Fr.) Donk as already indicated by Lowe on the herbarium sheet.

P. **pallidus** Berk. 1856 : 176.
«Panuré, (Brazil)».
= *Amauroderma camerarium* (Berk.) Furt.

P. **palmicola** Berk. & Curt. 1868 : 317.
«Cuba, Curtis (Wright) no 428».
= *Phellinus palmicola* (Berk. & Curt.) Ryv. For a description, see Ryvarden & Johansen (1980 : 1959).

P. **pansus** Berk. 1856 : 169.
«Spruce no 205 (Brazil)».
= *Amauroderma omphalodes* (Berk.) Torr.

P. **parmula** Berk. 1856 : 173.
«In Caatingas ad Panuré (Brazil) no 34».
= *Amauroderma exilis* (Berk.) Torr. as already indicated by Furtado (1981 : 43).

P. **partitus** Berk. 1856 : 170.
«Spruce no 200 (Brazil)».
= *Amauroderma calcigenum* (Berk.) Torr. teste Furtado (1981 : 31).

P. **passerinus** Berk. 1856 : 175.
«Caantinges, Panuré (Brazil)».
= *Amauroderma exile* (Berk.) Torr. as already indicated by Furtado (1981 : 43).

P. **peradeniae** Berk. & Br. 1873 : 51.
«Ceylon, G.H.K.J. Nov. 1867, no 221».
= *Oxyporus cervino-gilvus* (Jungh.) Ryv.

P. **percicinus** Berk. & Curt. in Berk. 1872 : 37.
«No 2945, Car. Inf. (S.Carolina USA) Ravenel».
= *Meripilus percicinus* (Berk. & Curt.) Ryv. For a description, see Ryvarden & Johansen (1980 : 423).

H. **pergamenea** Berk. & Br. 1873 : 57.
«Ceylon (Sri Lanka) 1851, J.H.K. Thwaithes».
= *Daedaleopsis pergamenea* (Berk. & Br.) Ryv. comb. nov. Basionym: *Hexagonia pergamenea* Berk. & Br. J. Linn. Soc. Bot. 14 : 57, 1873.

Fruitbody resupinate-effused with a narrow pileus, coriaceous when dry, pileus up to 4 mm wide, azonate, finely adpressed velutinate, dull and sandcoloured. Pore surface pale ochraceous, pores angular to somewhat split, 1-2 mm wide, up to 3 mm deep. Context and trama cinnamon, contrasting the pale porewalls, up to 1 mm thick.

Hyphal system trimitic, generative hyphae with clamps, 2-3,5 um wide, skeletal hyphae solid to thickwalled, 3-8 um wide (in Melzers reagent) yellowish to golden brown. Dendroid hyphae very common in the fruitbody, strongly branched in the upper part. Broken fragments of these hyphae may be taken as parts of binding hyphae, but the strong branching in the outer parts justifies the classification as dendroid hyphae. Spores not seen.

Superficially this species may remind of *Daedaleopsis styracina* (Henn. & Shir.) Imaz. from Japan, but this species has larger and more split pores, in places almost lamellate. Further, the context is also considerably paler than in *D. pergamenea*.Fresh specimens are desirable to examine the spores.

P. **peroxydatus** Berk. 1878 : 39.
The type has not been found (Pannant Hills, Parmatta, Australia).

P. **personatus** Berk. & Br. 1873 : 51.
«No 535 Ceylon (Sri Lanka).
= *Oxyporus cervino-gilvus* (Jungh.) Ryv. as already indicated by Reid (1957 : 135).

P. **pes-simiae** Berk. 1856 : 194.
The type has not been found. From the description and Berkeleys comments it is obviously a *Ganoderma* species.

P. **petaliformis**Berk. & Curt. 1868 : 307.
«Cuba (Wright) no 372».
= *Microporellus obovatus* (Jungh.) Ryv.

P. **petalodes** Berk. 1856 : 198.
«Ad truncos emortus, Panuré (Brazil)».
= *Rigidoporus microporus* (Fr.) Overeem, a young specimen.

T. **petersii** Berk. & Curt. in Berk. 1872 : 66.
«Alabama, Peters (United States)».
= *Fomitopsis supina* (Fr.) Ryv. a very young specimen as indicated by Bresadola on the sheet.

T. **phellinus**Berk. 1872 : 164.
The type has not been found.

P. **phlebophorus** Berk. 1855 : 177.
«New Zealand, Colenso».
= *Gloeoporus phlebophorus* (Berk.) Cunn. For a description, see Cunningham (1965 : 110).

P. **phocinus** Berk. & Br. 1873 : 52.
«Ceylon (Sri Lanka) G.H.K.J. Nov. 1867».
= *Coriolopsis caperata* (Berk.) Murr.

H. **picta** Berk. 1878 : 50.
«Admirality Islands. March 1875, Challenger».
= *Trametes scabrosa* (Pers.) Cunn. as indicated on the sheet already by Bresadola.

P. **platotis** Berk. & Br. 1879a : 401.
«Brisbane (Australia) C.E. Broome».
= *Polyporus grammocephalus* Berk. as already indicated on the sheet by Lloyd in 1914.

P. **plebeius** Berk. 1855 : 179.
«Himalaya».
= *Coriolopsis sanguinaria* (Kl.) Teng.

P. **pocas** Berk. 1878 : 51.
«Japan, F.V. Dickens».
= *Trametes pocas* (Berk.) Ryv. comb. nov. Basionym: *Polyporus pocas* Berk. J. Linn. Soc. Bot. 16 : 51. 1878.
This seem to be the valid name for the taxon described in Ryvarden & Johansen (1980 : 589) as *Trametes* cfr. *villosa.* As indicated there, *Trametes villosa* is an American species, macroscopically very similar to *T. pocas* but separated by larger spores as verified by spore-prints.

P. **polydactylus** Berk. 1856 : 196.
«No 59, Inter arborum putrices, Panuré, (Brazil)».
= *Amauroderma camerarium* (Berk.) Furt. The type is badly misshapen.

P. **polygrammus** Berk. & Curt. 1868 : 307.
Cuba, Wright no 349».
Nomen invalidum, non *P. polygrammus* Mont. 1842.
The type of Berkleys and Curtis invalid species is a specimen of *Microporellus obovatus* (Jungh.) Ryv.

P. **polytropus** Berk. & Br. 1873 : 49.
«No 604. Dolosbagey (Sri Lanka) 1868».
= *Coriolopsis sanguinaria* (Kl.) Ryv. as indicated on the label by Bresadola.

Porothelium rugosum Berk. 1856 : 237.
«Spruce no 44, Brazil».
= *Amauroderma sprucei* (Pat.) Torr.

P. **porphyritis** Berk. 1856 : 196.
«Spruce no 182 (Brazil)».
= *Microporellus obovatus* (Jungh.) Ryv. The type is sterile.

F. **princeps** Berk. & Curt. 1868 : 321.
«Cuba, Wright no 324».
= *Echinochaete brachyporus* (Mont.) Ryv.

P. **procerus** Berk. 1856 : 171.
«No 165, Ad terram, Panuré (Brazil) Martis/53».
= *Amauroderma exile* (Berk.) Torr. Teste Furtado (1981 : 43).

L. **proxima** Berk. 1876 : 162.
«New York (USA) Sartwell (USA)».
= *Daedaleopsis confragosa* (Fr.) Schroet.

D. **puberula** Berk. & Curt. in Berk. 1872 : 67.
«Pennsylvania (USA) Dr. Michener, no 3612».
= *Abortiporus biennis* (fr.) Murr. as already indicated on the herbarium sheet by O. Fidalgo.

T. **pura** Berk. & Curt. 1868 : 320.
«363 Gloeoporus conchoides Mont. Cuba, Wright».
= *Tyromyces leucomallus* (Berk. & Curt.) Murr.

F. **purpurascens** Berk. & Curt. 1867 : 321.
«Cuba, Wright no 319».
= *Phylloporus sp.?*
The species apparently belongs in the Agaricaceae, and the fruitbodies have probably been fleshy-gelatinous when fresh and are today horny and very dense. The pores are strongly decurrent on the stipe, the largest are about 1x3 mm and the colour is dark brown to purplish brown with small and angular pores along the margin. The hyphal system is monomitic with clamped generative hyphae which are strongly agglutinated, but in KOH swelling to 8 um in diameter. Along the hymenium there are numerous globose, smooth and IKI-negative spores, 3-4 µm in diameter and they seem to belong to the species. There are also numerous ornamented mouldy spores mixed in. The identity is unknown to me.

P. **purpurascens** (Berk.) 1879b : 210.
«Callerstoch 1825 (England)».
= *Daedaleopsis confragosa* (Fr.) Schroet., a very badly developed specimen. Bresadola has on the sheet stated that the type is indeterminable.

T. **pyrrohocreas** Berk. 1872 : 164.
«Australia».
= *Coriolopsis asper* (Jungh.) Teng.

P. **quadrans** Berk. & Br. 1879 : 400.
«Brisbane (Australia) no 1137. M. Bailey».
= *Fomitopsis quadrans* (Berk. & Br.) Reid. For a description, see Reid (1963 : 287-88).

P. **ramentaceus**Berk. & Br. 1878b : 210.
«Glamis (Scotland)».
= *Antrodia ramentacea* (Berk. & Br.) Donk. For a description, see Ryvarden (1976 : 86).

P. **rasipes** Berk. 1878 : 49.
«Admirality Islands (Indian Ocean) March 1875, Challenger».
= *Microporellus obovatus* (Jungh.) Ryv. as already indicated by Bresadola on the sheet.

P. **ravenalae** Berk. & Br. 1873 : 53.
«No 261 (Sri Lanka)».
= *Grammothele fuligo* (Berk. & Br.) Ryv.

P. **ravenelii** Berk. & Curt. in Berk. 1872 : 38.
«No 2859, Car. Inf. (South Carolina)».
= *Microporellus obovatus* (Jungh.) Ryv.

D. **ravenelii** Berk. 1872 : 68.
«On the dead oak, Aiken, Car. Inf. (S. Carolina USA) no 1775».
= *Phellinus viticola* (Schw.) Donk.
D. ravenelii has often been mixed up with *Irpex tabacina*, a species of *Hydnochaete*. See Ryvarden (1982) for further remarks.

P. **renatus** Berk. 1856 : 170.
«No 169 Ad terram in Caatingas, Panuré, Feb./53 (Brazil)».
= *Amauroderma exile* (Berk.) Torr. Teste Furtado (1981 : 43).

P. **rennyii** Berk. & Br. 1875 : 31.
«No 847, Glamis, on Pine (Scotland)».
= *Tyromyces rennyii* (Berk. & Br.) Ryv. For a description, see Ryvarden (1978 : 483).

D. **rhabarbarina** Berk. & Cooke in Cooke 1878 : 130.
«Pine logs. Gainsville, Fla. (Florida, USA) H.W.R. (Ravenel) no 24.
Invalid name, non *D. rhabarbarina* Mont. 1840.
The type of Berkeley and Cooke's invalid species is a specimen of *Gloeophyllum mexicanum* (Mont.) Ryv.

P. **rheicolor** Berk. & Curt. 1868 : 306.
«Cuba, Curits (Wright) no 366».
= *Inonotus splitbergeri* (Mont.) Ryv.

P. **rhinocephalus** Berk. 1860a : 253.
«Tasmania Australia».
= *Junghuhnia rhinocephalus* (Berk.) Ryv. comb. nov. Basionym: *Polyporus rhinocephalus* Berk. Flora Tasman. 2 : 253, 1860.
For a description, see Cunningham (1965 : 102).

H. **rigida** Berk. 1878 : 54.
«St. Howis Island, J.P. Fullager».
= *Hexagonia tenuis* (Hook.) Fr. as already indicated on the sheet by M. Fidalgo.

P. **rivulosus** Berk. & Curt. 1868 : 318.
«Cuba, Wright, no 154».
= *Physisporinus rivulosa* (Berk. & Curt.) Ryv. comb. nov. Basionym: *Polyporus rivulosus* Berk. & Curt. J. Linn. Soc. Bot. 10 : 318, 1968.
The species was treated by David (1971) who reported it as new for Europe and suggested a transfer to *Rigidoporus*. However, her proposed combination is not valid, lacking references to the original place of publication which is, according to the International Code of Botanical Nomenclature, necessary to make a valid new combination. To me the spores and microstructure indicate *Physisporinus* as the proper genus.

F. **ruficeps** Berk. & Br. 1873 : 57.
«46, Ceylon, G.H.K.T. (Thwaithes) (Sri Lanka)».
= *Echinochaete ruficeps* (Berk. & Br.) Ryv. For a description, see Ryvarden & Johansen (1980 : 321).

P. **rufo-atratus** Berk. 1856 : 174.
«No 196, Panuré (Brazil)».
= *Polyporus rhizomorphus* Mont. as indicated on the sheet by Bresadola.

P. **rufo-flavus** Berk. & Curt. 1868 : 310.
«Cuba, C. Wright no 191».
= *Flaviporus brownei* (Pers.) Donk. *P. rufo-flavus* is the type species of *Flaviporus.* Murr.

T. **rugosa** Berk. & Br. 1873 : 55.
«No 569 Centr. Province (Sri Lanka) 1868».
= *Lenzites acuta* Berk.

P. **russiceps**Berk. & Br. 1873 : 48.
= *Echinochaete russiceps* (Berk. & Br.) Reid. For a description see Ryvarden & Johansen (1980 : 323).

P. **russogramme**Berk. 1878 : 45.
«Ternato (Phillipine Islands) Challenger».
= *Trametes* sp. a small, immature, sterile and partly glued to the sheet.

P. **scabripes** Berk. & Curt. 1868 : 305.
«Cuba, Cortes, C. Wright no 380».
= *Polyporus* cfr. *tricholoma* Mont.?
The type consists of a small, centrally stipitate specimen, about 4 cm in diameter. The pileus is apparently smooth, but under a lens very fine, adpressed squamules are present. The surface is dark brown and no cilia are present along the margin today. Pore surface pale brown, pores 5-6 per mm, about 1 mm deep while the context is ochraceous and separated from the tubes by a denser layer.
The hyphal system is apparently dimitic even if binding hyphae are difficult to observe while the generative hyphae are 2-6 um wide and with clamps. Spores are cylindrical, smooth, thinwalled and non-amyloid, 7,5-9,5 x 2,5-3,5 um.
It may be that this species represents a taxon of its own in *Polyporus* s. str. as the fruitbody is larger than normally seen in *P. tricholoma.* The pileus is darker and binding hyphae are more difficult to observe than is normal in *P. tricholoma.* However, the spores are as in *P. tricholoma* and the same goes for surface structure and shape of fruitbody.

F. **saccharinus** Berk. 1878 : 43.
«Aru Islands (Indonesia) Sep. 1874, Challenger».
= *Favolaschia* sp. (Agaricales).

P. **salviae** Berk. & Curt. in Berk. 1872 : 54.
«Car. Inf. (S. Carolina, USA) no 2886».
= *Oxyporus corticola* (Fr.) Ryv. as already indicated by Lowe (1966 : 19).

P. **sartwellii** Berk. & Curt. in Berk. 1872 : 51.
«New York (USA) Sartwell».
= *Trichaptum biformis* (Fr.) Ryv.

F. **scaber** Berk. & Br. 1873 : 57.
«Ceylon».
= *Favolus brasilensis* (Fr.) Fr.

P. **scabriusculus** Berk. 1881 : 384.
The type has not been found.

P. **scalaris** Berk. 1856 : 199.
«Ad truncos emortus, Panuré, Feb./53. (Brazil).
= *Fomitopsis scalaris* (Berk.) Ryv. comb. nov.
Basionym: *Polyporus scalaris* Berk. Hook. J. Bot. 8 : 199, 1856.

Fruitbody pileate- dimidiate, applanate, up to 5 cm wide and long, 1 cm thick at the base, woody hard when dry. Pileus dark brown, sulcate in distinct zones, glabrous to very finely velutinate in some narrow bands, dull, no cuticle present. Pore surface tobacco brown, pores 6-8 per mm, almost invisible to the naked eye, tubes dark brown, stratified, up to 1,5 mm in each layer, context dark brown and very dense.

Hyphal system dimitic, generative hyphae hyaline, thinwalled and with clamps at the septa, skeletal hyphae dominating in the fruitbody, in the trama straight to slightly sinuous, pale yellowish brown and solid, 3-5 µm wide, in the context straight and up to 7 um wide. Spores not seen. Known only from the type.

With its perennial fruitbody, dimitic hyphal system with a total dominance of skeletal hyphae, the species seems best placed in *Fomitopsis*, even if the skeletal hyphae are coloured, which is not the case with the type species of the genus, viz. *F. pinicola* (Fr.) Karst. Fresh and fertile specimens are desirable to verify its generic status.

D. **scalaris** Berk. & Br. 1883 : 61.
«Brisbane (Australia) J.M. Bailey no. 429».
= *Lenzites elegans* (Fr.) Pat.

P. **scansilis** Berk. 1878 : 53.
«Juan Ferdanez (Chile) Challenger».
= *Ganoderma australe* (Fr.) Pat. as indicated by Bresadola on the sheet.

T. **sclerodepsis** Berk. 1856 : 236.
«Panuré (Brazil) M.T.B.».
= *Cerrena sclerodepsis* (Berk.) Ryv.

Fruitbody pileate, applanate, sessile to dimidiate, up to 12 cm long, 10 cm wide and 2 cm thick at the base, tough to hard. Pileus pale cinnamon to brown with age, dull, zonate and first adpressed velutinate with a thin layer of tomentum under which there is a darker zone. With age the tomentum wears away zonewise and in old parts the cuticle becomes totally exposed in dark brown colours and with a slightly wrinkled surface. Pore surface tan to pale cinnamon, pores round to angular, partly elongated, sinuous to labyrinthine, 2 per mm measured tangentially, up to 5 mm long radially. Tubes concolorous with poresurface, up to 5 mm deep. Context pale strawcoloured to tan, dense, fibrous and up to 6 mm thick at the base, in section with a dark zone between the context and tomentum.

Hyphal system trimitic, generative hyphae with clamps, in the subhymenium delicately thinwalled, 2-4 µm wide, in the trama, context and the tomentum, wider, slightly thickwalled, with wide lumen and clamps rather scattered, totally dominating in the tomentum, more scattered in the context and trama. Skeletal hyphae 4-10 µm wide, thickwalled, in some cases difficult to separate from the wide generative hyphae and long segments have to be examined to check the presence of clamps. Binding hyphae only observed in the basal parts of the context, moderately branched, often with long whip-like sidebranches and distinctly thinner than the skeletal hyphae, mostly 1,5-3 µm wide. Spores not seen.

Specimens have been examined from Argentine, Brazil, Bolivia, Peru and Colombia.

The species is related to *C. maximus* (Mont.) Hansen of the Caribbean area, which, however, is becoming distinctly hydnoid with age and is paler and more densely hirsute. Presently both species are placed in *Cerrena* because of the irregular poriod hymenophore and a dark zone below the tomentum, both characters known from the *C. unicolor*, the type of the genus.

P. **sclerodes** Berk. & Curt. 1868 : 311.
« *Pol rubiginosus* Fr. var. 1857. Cuba, Coll. C. Wright. (ink) *P. sclerodes* B. Fung. Cub. no. 235». (pencil) (FH).
= *Phellinus senex* (Nees & Mont.) Imaz.

There are no specimens under the name *P. sclerodes* in the Kew Herbarium and the Farlow specimen cited above is selected as neotype. Berkeley probably first named it as a variety of *P. rubiginosus* when the specimens where returned to Curtis in the United States. When he then changed his opinion and raised the taxon to specific level, he probably changed the label accordingly on his own specimen (now apparently lost) in London, but forgot to inform Curtis.

T. **scleromyces** Berk. 1879 : 31.
«Brazil. Glaziou no 8537».
= *Coriolopsis aethalodes* (Mont.) Ryv. The type is sterile.

P. **scleromyces** Berk. & Curt. 1868 : 312.
«An type ? Vix differt a *Fomes semitostus* Berk». (ink, in Bresadolas hand) (Cuba).
= *Fomitopsis supina* (Fr.) Ryv.

T. **scrobiculata** Berk. 1877 : 70.
«Melbourne, le Fevre, no 212 (Australia)».
= *Perenniporia ochroleuca* (Berk.) Ryv. as already noted on the sheet by G.H. Cunningham.

P. **semiclausus** Berk. 1856 : 193.
«Spruce no 56 (Brazil)». Selected as lectotype.
= *Amauroderma schomburgkii*(Berk.) Torr. as already indicated by Furtado (1981 : 80).

P. **semidigitaliformis** Berk. 1878 : 39.
«Pennant Hills, Paramatta (Australia) June 1874».
= *Trametes* sp. a small, immature and sterile specimen.

P. **seminigrita**Berk. & Cook 1987 : 377.
«Trail no 102 Olydoa (Para prov. Brazil).
= *Polyporus guyanensis* Mont. as indicated by M. Fidalgo on the herbarium sheet.

P. **semisupinus**Ber. & Curt. in Berk. 1872 : 50.
«Nova Angl. (USA) Sprague no 5860».
= *Antrodiella semisupina* (Berk. & Curt.) Ryv. for a description, see Lowe (1975 : 50).

P. **sobrius** Berk. & Curt. 1868 : 316.
«Cuba, La Perla. C. Wright no 107».
= *Tyromyces* or *Junghuhnia* sp? There is a detailed description in Lowe (1975). However, I am not sure whether the few cystidia observed are gloeocystidia as such. They are clublike, but the content is opaque and it is difficult to decide whether they are thickwalled as in a *Junghuhnia* sp. The hyphal system is dimitic and the few spores observed in the isotype in FH, were oblong ellipsoid, hyaline and smooth 3-4 x 2-2,5 μm. They were only seen floating, but they have a distinct apiculus and probably belong to the species. The hymenophore is first poroid, but splits up with age and becomes more dark brown and resinous dense as is evident from parts of the type. Fresh material is necessary to settle the generic assignment of this species.

P. **sordidus** Berk. in Fr. 1851 : 80.
«Brit. Guiana ex Herb. Hook. in ramis carbonceus».
= *Coriolopsis floccosa* (Jungh.) Ryv. as already indicated on the sheet by Bresadola.

P. **spragueii** Berk. & Curt. in Berk. 1872 : 50.
«New England, Murray (USA)».
= *Trametes spragueii* (Berk. & Curt.) Ryv. For a description, see Lowe (1975 : 68) or Ryvarden & Johansen (1980 : 586).

F. **sprucei** Berk. 1856 : 237.
«Spruce no 117 (Brazil)».
= *Favolaschia sprucei* (Berk.) Sing. For a description, see Singer (1945 : 202).

D. **sprucei** Berk. 1856 : 236.
«No 41, Panuré (Brazil)».
= Accepted species in *Daedalea*, for a description, see Ryvarden & Johansen (1980 : 306).

T. **sprucei** Berk. 1856 : 236.
«No 41, Panuré (Brazil)».
= *Trametes* cfr. *marianna* (Pers.) Ryv. The type is sterile and badly developed, but the macroscopical and microscopical characters otherwise are in accordance with those of *T. marianna.*

F. **squamiger** Berk. 1872 : 166.
«New England, Australia)».
= *Polyporus arcularius* Fr. as indicated by Cunningham (1965 : 84).

P. **squarrosus** Berk. & Curt. in Berk. 1872 : 52.
«Car. inf. (S. Carolina, USA) in Lirodendron, no 4935».
= *Trametes cervina* (Schw.) Bres. The type is sterile.

P. **stereinus** Berk. & Curt. 1868 : 308.
«Cuba, Wright 189».
= *Antrodiella liebmannii* (Fr.) Ryv.

P. **stiptiarius** Berk. & Curt. 1868 : 304.
«Cuba, C. Wright no 90».
= *Polyporus tricholoma* Mont. as already indicated on the sheet by Bresadola.

P. **subflexibilis** Berk. & Curt. 1868 : 311.
«Cuba, C. Wright no 165».
= *Loweporus roseo-albus* (Jungh.) Ryv.

P. **subgelatinosus** Berk. & Br. 1876 : 136.
«Rannoch, J.B. White (England)».
= *Rigidoporus vitreus* (Fr.) Donk.

P. **subgiganteus** Berk. & Curt. in Berk. 1872 : 49.
«C. Wright, Connecticut (USA) 5594».
= *Tyromyces subgiganteus* (Berk. & Curt.) Ryv. comb. nov. Basionym: *Polyporus subgiganteus* Berk. & Curt. Grevillea 1 : 49, 1872.
This is the same taxon as *Tyromyces spumeus* var. *malicola* (Lloyd) Lowe, of which there is a description in Overholts (1953 : 319). However it is better placed in *Tyromyces* in a wide sense, than in *Spongipellis* which is characterized by thickwalled, cyanophilous globose spores and thick, fibrose and duplex fruitbodies. *T. subgiganteus* is probably related to *T. fissilis* because of its broad spores and a resinous, dense tubelayer in dry condition.

P. **subliberatus** Berk. & Curt. 1968 : 318.
«Cuba, Curtis (Wright) no 394».
= *Rigidoporus lineatus* (Pers.) Ryv.

P. **subolivaceus** Berk. & Curt. 1868 : 313.
«Cuba, C. Wright no 163».
= *Fomitopsis supina* (Fr.) Ryv. as indicated by Bresadola on the sheet. The colour of the context in this specimen is more olivaceous than usual.

P. **subpellucidus** Berk. 1878 : 51.
«Japan, Apr. 1875, Challenger».
= *Trametes pocas* (Berk.) Ryv.

P. **subpulverulentus** Berk. & Curt. 1968 : 306.
«Cuba, Curtis (Wright) no 382».
= *Dictyopanus pusillus* (Fr.) Sing. as indicated by Singer (1945 : 224).

P. **substuppeus** Berk. & Cooke 1878 : 380.
«Trail no 123 (Brazil)».
= *Coriolopsis substuppeus* (Berk. & Cooke) Ryv. comb. nov.
Basionym: *Polyporus substuppeus* Berk. & Cooke, Linn. Soc. J. Bot. 15 : 380 , 1876.

There is a good description in Lowe (1975 : 24 as *Tyromyces substuppeus*) where, however, the hyphal system is reported to be monomitic. According to my examination it must be defined as dimitic with a dominance of tinted skeletal hyphae, especially in the context where it is difficult to find hyphae with septa. In the trama clamps are more easily found.

The striking macroscopical character is the even cinnamon to rusty brown colour, very different from that of the *Tyromyces* where almost all species are white to lightcoloured. The lower context has a dark resinous zone, which is developed with age as it is almost absent in a specimen from Trinidad in the Kew Herbarium which otherwise is identical, both macro-and microscopically with the type.

Coriolopsis includes mostly trimitic species, and *C. substuppeus* deviates somewhat by its absence of binding hyphae. The taxonomy of the trimitic trametiod genera is difficult because there are few reliable characters that separate them. *Coriolopsis* and *Trametes* are very similar and in principle only separated by the colour.There are, however, some rather disturbing intermediate species and many *Trametes* sp. become cinnamon or dark ochraceous with age. The whole question will be treated in a later paper, and for the time being *P. substuppeus* is left in *Coriolopsis.*

P. **subvinctus** Berk. & Br. 1873 : 54.
«603 Dolosobagey (Sri Lanka) May 1868».
= *Fomitopsis* sp. resupinate condition ? The specimen is sterile, has a trimitic hyphal system with small pores and an ochraceous pore surface. Its identity is unknown.

D. **subsulcata**Berk. & Br. 1873 : 56.
«No 567, N. Ceylon (Sri Lanka) Dec. 1867».
= *Lenzites acuta* Berk.

P. **sulcifer** Berk. & Cooke 1876 : 383.
«Brazil, Trail no 97».
= *Trametes villosa* (Fr.) Kreisel.

P. **superpositus** Berk. 1872 : 161.
«New England (Australia)».
= *Flabellophora superposita* (Berk.) Cunn. For a description, see Cunningham (1965 : 88).

P. **tasmanicus** Berk. 1860a : 254.
«Tasmania, (Australia)».
= *Fomitopsis tasmanicus* (Berk.) Cunn. For a description, see Cunningham (1965 : 148).

P. **tenellus** Berk. in Cooke & Ellis 1878a : 81.
«On pine boards New Jersey (USA) Newfield. J.B. Ellis 2819a».
= *Meruliopsis bellus* (Berk. & Curt.) Ginns. This possibility was suggested by Lowe (1966 : 33). Whether *Meruliopsis* will be the correct genus, may be discussed as the borderline between *Gloeoporus* and *Meruliopsis* is difficult to draw properly. However, for the time being I follow Ginns (1976) in his generic concept.

P. tenerrimus Berk. & Rav. in Berk. 1872 : 65.
«January, on bark of dead *Carpinus*, S.C. (South Carolina, USA)».
There is no fungus left today, only disintegrated bark, as also noted by Lowe (1966 : 165) who believed it to be based on large cork-cells.

P. tephronotus Berk. 1860a : 252.
«Tasmania (Australia)».
= *Tyromyces tephronotus* (Berk.) Cunn. For a description, see Cunningham (1965 : 131).

P. terebrans Berk. & Curt. 1868 : 306.
«Cuba, Curtis (Wright) no 410».
The type is in bad condition and no generative hyphae were seen. The pores are badly contaminated with many different spores. The original description calls for a species with a yellow cap and white hymenium. There are a few gloeopleurous hyphae structures in the lower context and it may be that the type is a specimen of *P. leucomallus* Berk. & Curt. where such structures are known and which has a yellowish pileus. On the herbarium sheet there is a note from Bresadola that the specimen is undeterminable.

T. terrei Berk. & Br. 1876 : 136.
«Stoke (England) Poges 1875».
= *Abortiporus biennis* (Fr.) Murr. as noted by Bresadola on the sheet.

P. testudo Berk. in Berk. & Br. 1882 : 59.
«Brisbane (Australia) no 323».
= *Nigroporus durus* (Jungh.) Ryv. as already indicated by Lloyd on the sheet.

H. thwaitesii Berk. & Curt. 1860 : 122.
«Bonin (Japan) US Expl. Expd.».
= *Hexagonia tenuis* (Hook.) Fr.

P. tuba Berk. & Curt. 1868 : 305.
«Cuba, Curtis (Wright) no 385».
= *Microporellus obovatus* (Jungh.) Ryv. a very badly developed specimen.

P. undigerus Berk. & Curt. 1868 : 317.
«Cuba, Curtis (Wright) no. 457».
= *Junghuhnia undigerus* (Berk.) Ryv. comb. nov.
Basionym: *Polyporus undigerus* Berk. J. Linn. Soc. Bot. XX: 317, 1868.

Fruitbody pileate, effused-reflexed or dimidiate to almost laterally stipitate, single or in imbricate clusters, tough when fresh, fragile when dry. Pileus ochraceous with a pinkish tint when fresh, drying tan to sandcoloured or pale straw coloured, azonate to narrowly zonate, adpressed velutinate and soft, up to 1 cm wide and long.

Pore surface pale ochraceous with a pinkish tint when fresh, drying more sand- to straw-coloured, pores angular, incised and split on more sloping parts of the fruitbody, 5-7 per mm, larger and more irregular sinuous in the split or incised part.

Tubes concolorous up to 2 mm deep. Context cream to ochraceous, up to 1 mm thick.

Hyphal system dimitic, generative hyphae with clamps, delicately thinwalled, 2-3 µm wide, skeletal hyphae abundant, straight to flexuous, mostly unbranched, rarely dichotomously branched, thickwalled and usually of more or less even width, but now and then swollen to oblong segments, up to 10 um wide, otherwise 2-4 µm wide and with thick walls. Cystidia scattered, arising from skeletal hyphae either rounded or with a papillae, up to 12 um wide close to the tip, encrusted to almost smooth, most common in the dissepiments, enclosed in the trama or obliquely projecting into or above the hymenium. Spores broadly ellipsoid to subglobose, hyaline, thinwalled and non-amyloid, 4-5 x 3,5-4 µm.

The species is easy to recognize by the small ochraceous pilei, often in imbricate clusters on standing dead trees, the large cystidia and the relatively large spores. The pileate condition and the large spores separate it from *J. nitida* to which it is undoubtedly related.

T. **ungulata** Berk. 1872 : 165.
«Adelaide (Australia)».
= *Trametes nivosa* Berk.
The type of *T. ungulata* is a small specimen, but the hyphal structure, the spores and the colour of the pileus are identical with that of *T. nivosa.* As far as I know, *T. nivosa* has not been reported from Australia before.

P. **variabilis** Berk. 1856 : 193.
«No 57, terram in sylvis, Panuré (Brazil)». Selected as lectotype.
= *Amauroderma camerarium* (Berk.) Furt. as indicated by Furtado (1981 : 35).

H. **variegata** Berk. & Curt. 1860 : 122.
«No 21. St. Domingo».
= *Hexagonia papyracea* Berk. as already indicated by Fidalgo, M. & Fidalgo, O. (1968 : 84).

P. **variolosus** Berk. & Br. 1873 : 52.
«No 650, South of the islands (Sri Lanka)».
= *Coriolopsis* sp. immature and badly developed, sterile

P. **verecundus** Berk. & Curt. 1868 : 309.
«Cuba, Wright, Curtis, no 414».
= *Tyromyces leucomallus* (Berk. & Curt.) Murr. as already indicated by Lowe (1975 : 35).

P. **vernicifluus** Berk. 1860a : 254.
«Tasmania (Australia)».
= *Antrodiella liebmannii* (Fr.) Ryv. as already indicated by Bresadola on the sheet.

P. **vernicosus** Berk. 1856 : 175.
«In truncos putridis, Panuré (Brazil) no 59».
= *Polyporus diabolicus* Berk. as indicated by Bresadola on the sheet.

P. **versicutis** Berk. & Curt. 1868 : 308.
«Cuba, Wright no 137». Selected as lecotype by Lowe in 1964.
= *Tyromyces versicutis* (Berk. & Curt.) Murr. For a description, see Lowe (1975 : 54).

T. **versiformis** Berk. & Br. 1873 : 56.
«No 968, Central Prov. (Sri Lanka) 1868».
= *Trametes scabrosa* (Pers.) Cunningh. a young specimen.

P. **vesiculosus** Berk. & Curt. in Berk. 1872 : 65.
«Alabama, (USA) Peters no. 4587».
= *Stromatoscypha fimbriata* (Fr.) Donk?
Lowe 1966 : 17 indicates it to be *Oxyporus corticola*, but clamps are present on scattered hyphae in the fruitbody and consequently *Oxyporus* is excluded. Bresadola has on the sheet indicated it to be a myriadoporous form of a *Poria* and this may well be correct. The shallow pores with a restricted opening remind much of a young fruitbody of *Stromatoscypha fimbriata*. The name should be dropped from consideration.

P. **vespilloneus** Berk. 1856 : 200.
«No 177, ad truncos emortus, Fl. Uaupes Feb./53». (Brazil).
= *Coriolopsis* cfr. *caperata* (Berk.) Murr. a young, sterile and subresupinate form.

P. **vibratilis** Berk. & Curt. 1868 : 314.
«Cuba, C. Wright, no 159».
= *Loweporus roseo-albus* (Jungh.) Ryv. resupinate form as already indicated by Bresadola on her herbarium sheet.

P. **virgatus** Berk. & Curt. 1868 : 304.
«Cuba, C. Wright mo 94».
= Accepted in *Polyporus* s. str. For a description, see Ryvarden & Johansen (1980 : 509).

P. **viridans** Berk. & Br. 1861 : 379.
«Staunton, Notts. 1860 (England)».
= *Ceriporia viridans* (Berk. & Br.) Donk. For a description, see Lowe (1966 : 30) as *Poria rhodella* Fr., a name of uncertain application.

P. **warmingii** Berk. 1879 : 32.
«Brazil, Glaziou. 9107».
= *Stereum* sp., badly developed. D. Reid has noted on the sheet: «Doubtful if a polypore».

P. **wynnei** Berk. & Br. 1859 : 358.
«Coed Coch (England)».
= *Tyromyces wynnei* (Berk. & Br.) Donk. For a description, see Ryvarden (1976 - 78 : 494).

P. **xerophyllaceus** Berk. 1856 : 200.
«Spruce no 179, Panuré (Brazil)».
= *Nigroporus vinosus* (Berk.) Murr.

P. **xerophyllus** Berk. 1855 : 178.
«N.Z. (New Zealand) Bay of islands».
= *Polyporus* cfr. *dictyopus* Mont. Cunningham (1965 : 86) accepts the species of its own lased on a slight difference in pore size and some other rather marginal characteristics.

P. **xylodes** Berk. 1856 : 171.
«Spruce no 42, (Brazil)».
= *Amauroderma schomburgkii* (Mont. & Berk.) Torr. Teste Furtado (1981 : 80).

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MYCOTAXON

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MYTILODISCUS
A NEW GENUS OF INOPERCULATE DISCOMYCETES

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During a late winter collecting trip on Mary's Peak in the coast range of western Oregon, a very unusual discomycete was collected on fallen, dead leaves of Alnus rubra Bong. suspended in the alder canopy. Abundant, minute, black, stipitate apothecia covered the dead leaves, but the fructifications were immature. Periodic collections were made during the year until mature sporocarps were found in April, 1983. Other populations of this discomycete were discovered in two other areas on Mary's Peak, at lower elevations in McDonald State Forest about 70 km NE of Mary's Peak, and again in early 1984 at Alsea Falls State Park, south of Mary's Peak.

Following our examination of the collections and a survey of the mycological literature, we conclude that this fungus represents an undescribed genus of inoperculate discomycetes. We supply a generic diagnosis here:

Mytilodiscus Kropp & S.E. Carpenter, gen. nov.

Genus familiae Leotiaceae (Helotiales). Apothecia stipitata, nigra. Receptaculum profunde hysteriforme. Asci ex uncis nati, cylindracei-clavati. Ascosporae hyalinae. Excipulum exterius textura prismatica. Species typica generis: Mytilodiscus alnicola Kropp & S.E. Carpenter.

Etymology of the generic name: Mytilus (a genus of black, bivalve molluscs; referring to the shape of the receptacle) + discus (referring to discomycete).

Mytilodiscus alnicola Kropp & S.E. Carpenter, sp. nov.

> Apothecia stipitata, nigra. Receptaculum profunde hysteriforme. Hymenium cremeum. Asci (52.5-) 60-70 (72.5) x 6-7.5 µm, octospori, apice rotundata vel subpapillosa, J+. Ascosporae (8.7-) 10 (-12.5) x (2.5-) 3.7 µm, clavatae, apice rotundata. Holotypus: B. Kropp, s.n., 9 Apr 1983 (OSC 41,244).

Apothecia: stipitate-cupulate, superficial, scattered to gregarious; receptacle and stipe black, smooth, glossy, when dry complanate and appearing hysteriform, brittle, up to 1 mm high, the receptacle 0.50-0.75 mm long; when rehydrated cartilaginous and the opening over the hymenium elliptic-fusoid, the hymenium pale cream.

Asci: Eight-spored, clavate, (52.5-) 60-70 (-72.5) x 6-7.5 µm, slightly tapered toward a rounded or subtruncate base, the apex rounded, ascus pore channel J+ without KOH pretreatment.

Ascospores: Fusiform, aseptate, smooth, hyaline, eguttulate, rounded at the ends, slightly broader at the apex than the base, often slightly curved and appearing suballantoid, (8.7-) 10 (-12.5) x (2.5-) 3.7 µm, regularly to irregularly biseriate in the asci.

Paraphyses: Filiform, unbranched, septate, apex obtuse to acute, upper portion lightly encrusted with a hyaline, amorphous material, extending up to 12 µm beyond the asci.

Ectal excipulum: 30-55 µm thick, consisting of two layers: outer layer of 1-2 cells, composed of vertically oriented, thin-walled, rectangular cells 10-12 x 3-4 µm, with the outer walls roughened and pigmented dark brown; inner layer a textura prismatica of vertically oriented, compact, parallel, smooth, hyaline, thin-walled hyphae, cells 15-20 x 2.5-3.5 µm, cells narrower in the stipe, there lightly encrusted with brown pigment, at the

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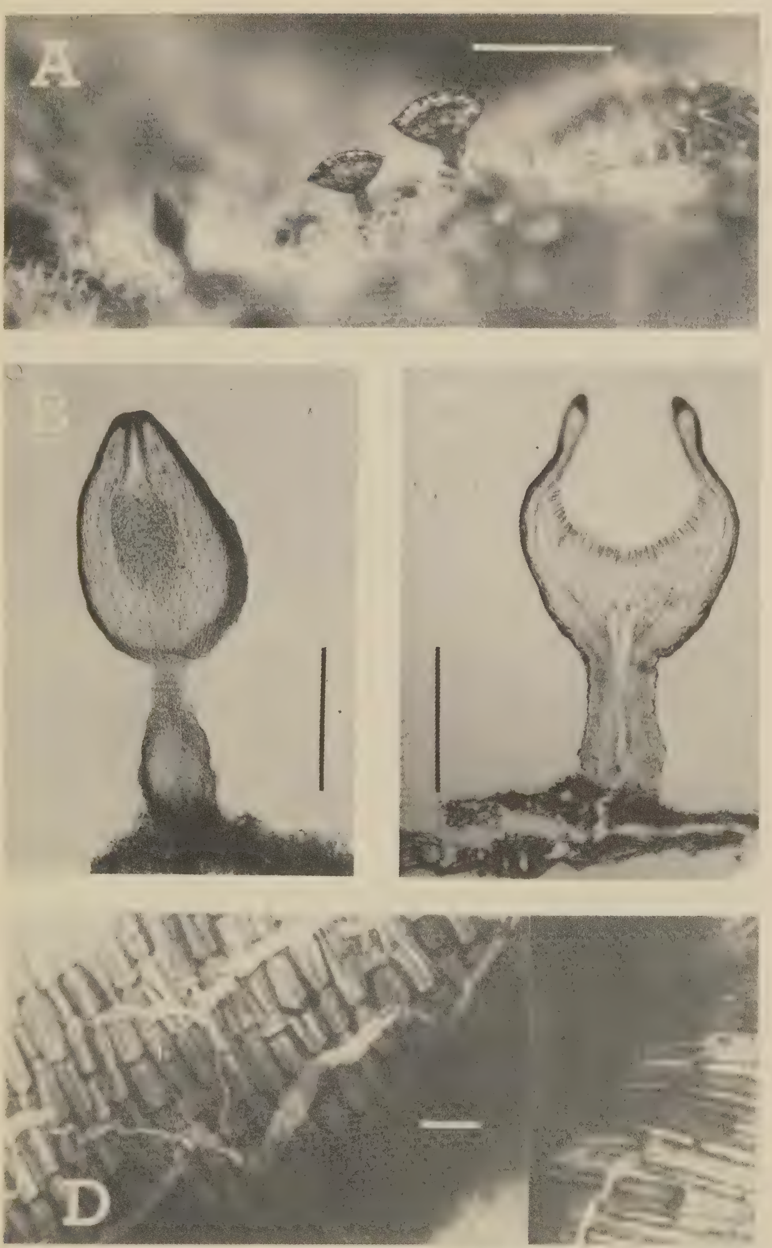
Figure 1. A) Mytilodiscus alnicola on Alnus (Scale = 1.0 mm). B) Section through an immature, closed ascocarp (scale = 250 microns). C) Section through a mature, open ascocarp (scale = 250 microns). D) Squash mount showing cracking on the surface of the ectal excipulum (scale = 10.0 microns).


A
B
D

juncture with the subhymenium a layer of 1-2 cells pigmented light brown.

Subhymenium: Well-developed, composed of loosely interwoven, smooth, hyaline, ascogenous hyphae 2.5-3.0 µm wide, with interstitial spaces between hyphae.

Medullary excipulum: Composed of vertically oriented, parallel, compact, smooth, hyaline hyphae ca 2.5 µm wide in the receptacle, filling the central 30-55 µm portion of the stipe, there the hyphae 1.5 µm wide.

Habitat: On dead, dry leaves of *Alnus rubra* Bong. suspended in the tree canopy.

HOLOTYPE: NORTH AMERICA: United States of America. Oregon. Benton Co.: Siuslaw National Forest, Mary's Peak, on leaves of *Alnus rubra* Bong. suspended in the canopy, 9 Apr 1983, B. Kropp s.n. (OSC 41,244).

CULTURAL CHARACTERISTICS: Cultures were obtained from single ascospores or mass ascospore shoots on malt extract agar. Growth was slow (ca 5 mm radial growth in 8 weeks) and best on malt extract agar. Colonies were gray, pulvinate, composed of densely packed mycelium 1.7-5.0 µm diam, with some internal hyphae in the colony becoming encrusted. No sporulation occurred on malt extract, potato dextrose, V-8 oatmeal agars, nor on autoclaved alder leaves placed on malt extract agar.

DISCUSSION

Macroscopically, *Mytilodiscus alnicola* is strikingly similar to *Phaeocalicium compressulum* (Nyl.: Vain.) A. Schmidt. Both have black, stipitate, strongly flattened ascocarps when dry. We have compared *M. alnicola* with a collection of *P. compressulum* and with descriptions of other *Phaeocalicium* species, and found significant microscopic differences between them. *Phaeocalicium* is a genus in the Caliciales which has dark, non-mazaedial apothecia and lacks an algal associate. All species have

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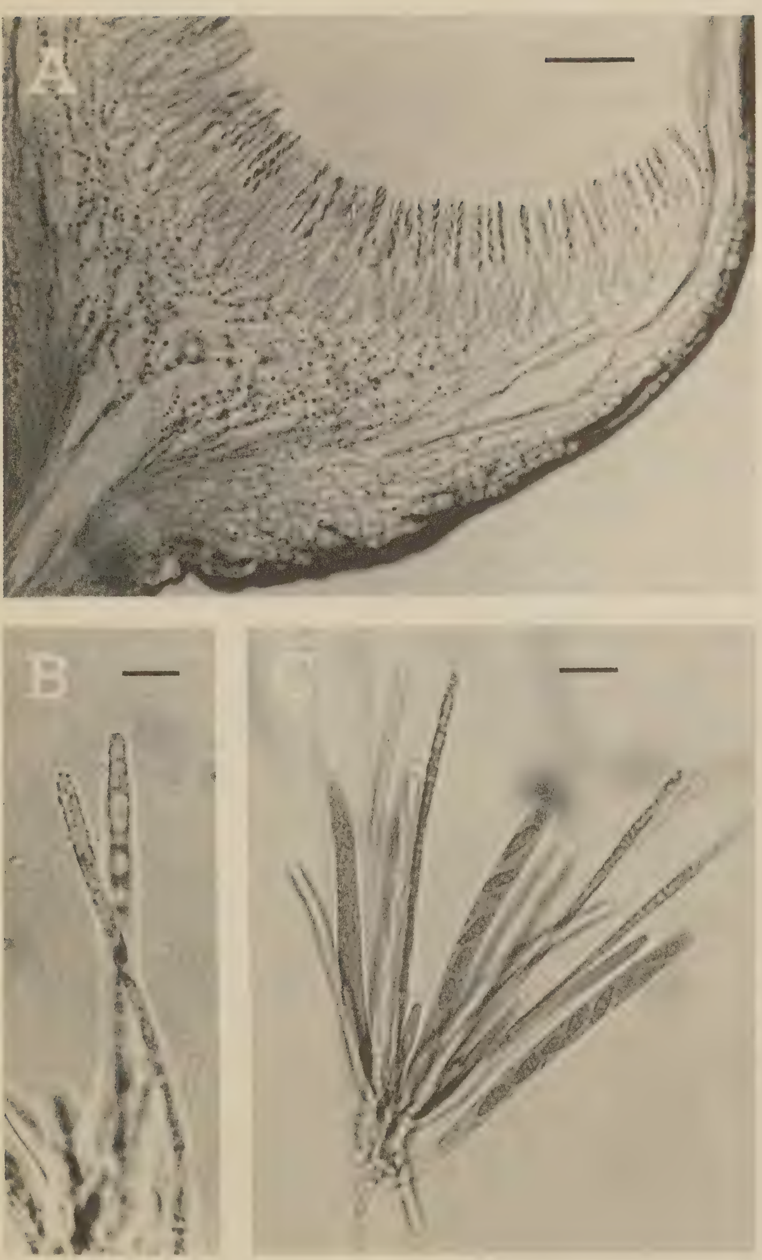
Figure 2. A. Section showing ectal excipulum, hymenium, and subhymenium (scale = 50 microns). B) Encrusted paraphyses (scale = 5.0 microns). C) Asci and paraphyses (scale = 10.0 microns).


A
B
C

brown, septate ascospores, except *P. compressulum*, which has brown, aseptate ascospores. Our examination of a collection of *P. compressulum* revealed ascospores which are very thick-walled in youth (similar to those of *Ascobolus*), becoming dark brown, faintly roughened, and uniseriate in the ascus at maturity. The asci of *P. compressulum* are narrow, cylindrical, with a long-papillate apex which is J- in IKI. We were unable to discern interthecial elements in its hymenium. The stipes of *Phaeocalicium* species are composed entirely of narrow, parallel, rectangular cells (Tibell 1975, 1981). *Phaeocalicium compressulum* is found on the bark of *Alnus* spp., and its ascocarps are much smaller than those of *M. alnicola*. *Mytilodiscus alnicola*, on the other hand, has ascospores which are thin-walled in youth, remaining smooth and hyaline at maturity, and which are irregularly biseriate in the ascus. Its asci are clavate with a rounded apex and an ascus pore channel that is J+ in IKI. Obvious, apically roughened, hyaline paraphyses are present in the hymenium of *M. alnicola*. *Mytilodiscus alnicola* has a well-developed subhymenium and medullary excipulum composed of long-celled hyphae which extend into the stipe (Fig. 1C). The apothecia of *M. alnicola* are larger than those of *P. compressulum* and are found on dead leaves of *Alnus rubra*, suspended in the canopy.

Although *Mytilodiscus alnicola* strongly resembles *Phaeocalicium compressulum* macroscopically, its microscopic structure is typical of members of the Leotiaceae (Helotiales). *Mytilodiscus alnicola* is not similar to descriptions of other species of *Phaeocalicium*. We feel that the unusual morphology of *M. alnicola* is more likely to be the result of adaptation to its environment than to a relationship with members of *Phaeocalicium*. It is not unusual for fungi that occur in exposed environments to develop morphological modifications to protect the hymenium from extreme conditions (i.e., *Schizophyllum*). *Mytilodiscus alnicola* was found on dead alder leaves suspended above the ground, an environment subject to much dryer conditions than other terrestrial microhabitats. Its dark, tough apothecium, which opens to expose the hymenium when moist and closes when dry, is well adapted to environmental fluctuations. Within the Helotiales, this type of apothecial morphology is exemplified by some species of *Crocicreas* (Carpenter, 1981) which grow suspended on herbaceous stems. The apothecia become complanate when dry, and open when exposed to high humidity.

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A NEW SPECIES OF PYTHIUM ISOLATED FROM SOIL IN COLORADO

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SUMMARY

Pythium nunn a newly discovered species from Colorado, USA is reported. It is characterized by smooth, globose oogonia; one to five, monoclinous to diclinous antheridia per oogonium; aplerotic oospores and globose hyphal swellings. Morphological characters do not match the descriptions of any known species of *Pythium* Pringsheim.

INTRODUCTION

Recently it was demonstrated that soil could become suppressive to a pathogenic species of *Pythium* (as evidenced by a decrease in propagule density) when dried bean leaves were added at weekly intervals to soil that was originally conducive. The decline in population density and activity of the *Pythium* sp. was associated with an increase in population density of an unidentified species of *Pythium*. These isolates were mycoparasitic to several species of *Pythium* and *Phytophthora* and also suppressed the competitive saprophytic ability of the pathogenic species of *Pythium* in raw soil. However, the isolates did not induce seed or seedling damping-off to several test plants.

The isolates from soil formed relatively small colonies (<25 mm in diameter) after 4 days incubation at 26 C on selective medium (Mircetich and Kraft, 1973). On potato dextrose agar, the fungus had a rosette habit of growth. It seldom sporulated when grown at 26 C for 14 days on any of the following agar media: cornmeal (Difco Laboratories Inc., Detroit, MI 48201), V-8 juice (Miller, 1955), and oatmeal and water (Hancock, 1977). However, abundant production of oogonia and hyphal swellings (sporangia) occurred when the fungus was grown on rolled oat and water agar medium (Hancock, 1977) supplemented with dry bean leaves. Since the morphological characteristics of this unidentified species of *Pythium* did not match any of the species reported in the literature (Middleton, 1943; Van der Plaats-Niterink, 1981; Waterhouse, 1968) it is described here as a new species.

Pythium nunn Lifshitz et al, sp. nov. Figs. 1-3. Hyphae 1.5-6.5 µm diametro. Sporangio et zoosporis non visa.

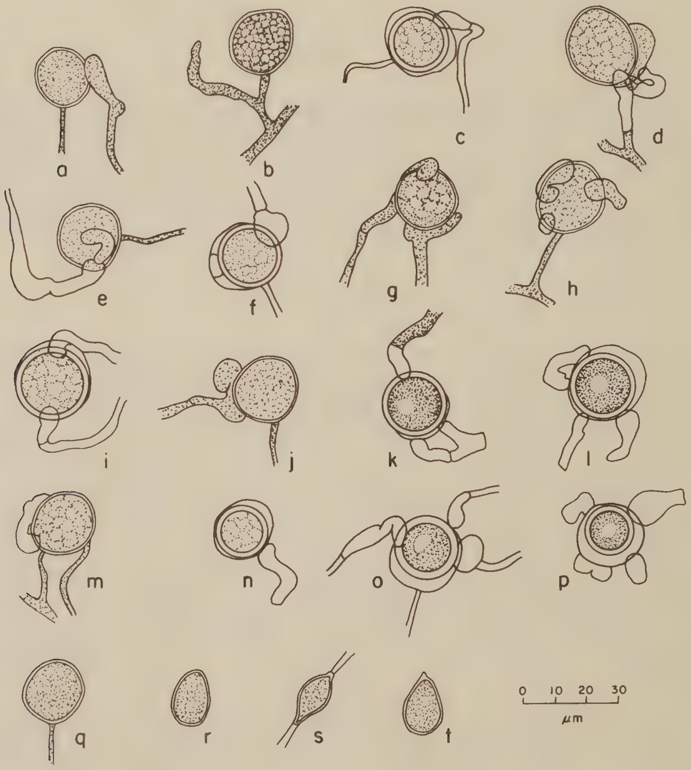

Fig. 1. *Pythium nunn*. Camera lucida drawings.
a-p) Oogonia, antheridia, and oospores.
q-t) Sporangia.

Corporibus hypharum terminalis, rare interposita, sphaerica vel subsphaerica, 12-22.5 (medio 16.2) µm

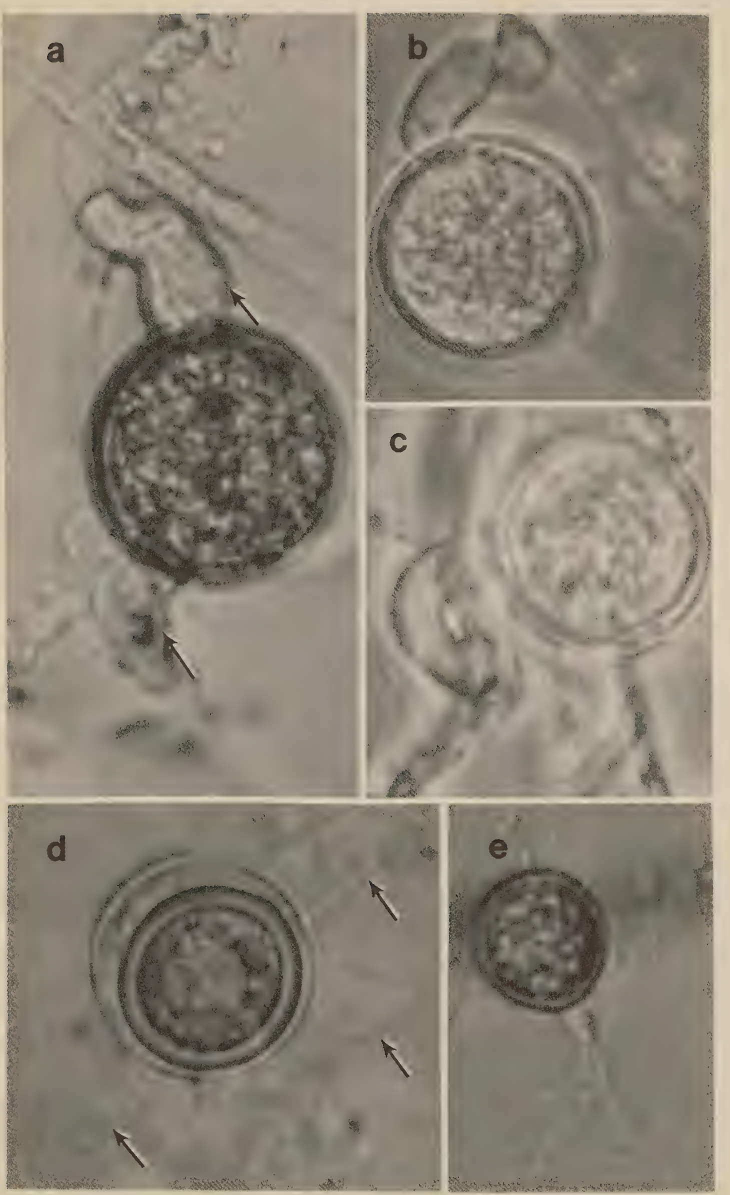

Fig. 2. Phase-contrast micrographs of Pythium nunn (X1660). a) An oogonium with two antheridia (arrows). b,c) Oogonia with single antheridium attached to each. e) Acrogenous sporangium.

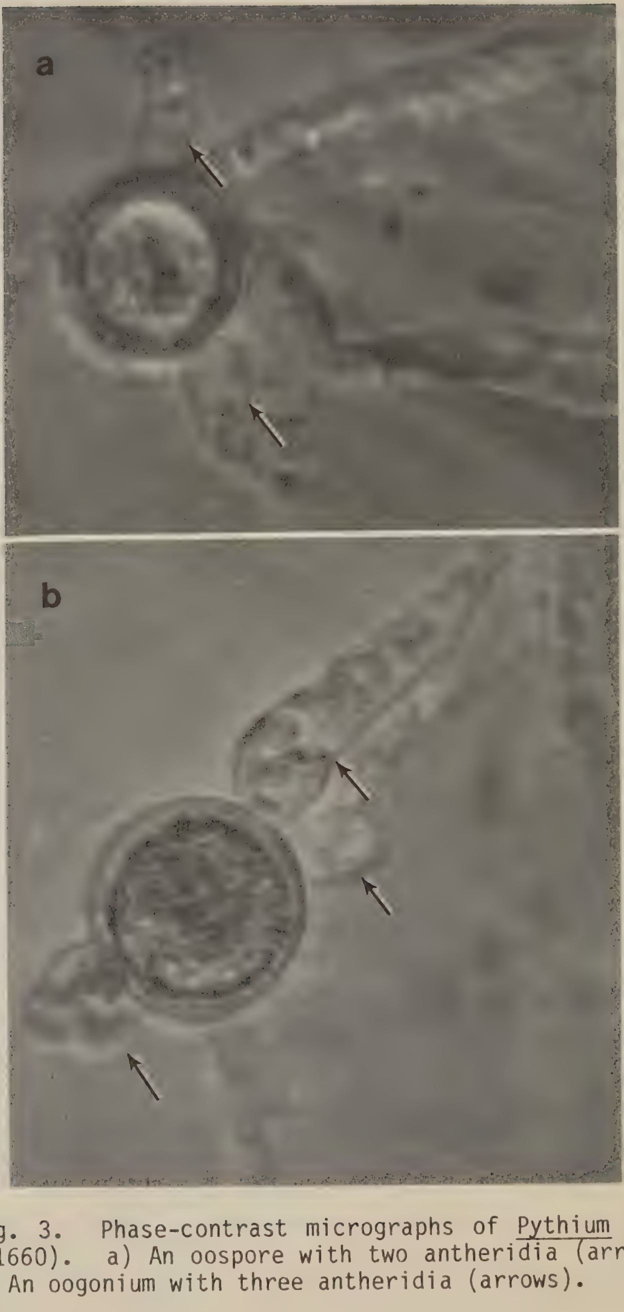

Fig. 3. Phase-contrast micrographs of Pythium nunn (X1660). a) An oospore with two antheridia (arrows). b) An oogonium with three antheridia (arrows).

diametro. Oogonia terminalia, globosa vel subglobosa, levis, tenuitunicata, 18.5-23.0 (medioc 20.8) μm diametro. Antheridia monoclinum vel diclinum, 1-5 per oogonium; antheridia inflata, circinata. Oospore aplerotica, 18-20.5 (medio 19.2) μm diametro; tunicis 2 um crassis.

Hyphae growing on rolled oat and water medium and supplemented with bean leaves (Phaseolus vulgaris L.) were 1.5-6.5 μm diam, extensively branched with delicate side-branches. Oogonia were formed within 10 days of incubation at 26 C under diurnal conditions. Oogonia were always acrogenous and spherical measuring 18.5-23.0 μm (average 20.8 μm diam) (Figs. 1-3). The oogonial cell wall was smooth and thin (<1 μm). Antheridia were monoclinous or diclinous, genenrally borne on an inflated or crooked antheridial stalk several times the length of the cell. Antheridial cells were lobulate or club shaped (Figs. 1-3). One to five antheridia were apically attached to each mature oogonium and, of 300 oogonia, 47.3% bore two or more antheridia. Mature oospores were aplerotic, thick walled (>2 μm) and measured 18.0-20.5 μm in diam, with an average of 19.2 μm (Figs. 1-3).

Hyphal swellings (sporangia), formed within 14 days, were acrogenous or intercalary, spherical, oval or lemon shaped, measuring 12.0-22.5 μm long and average 16.2 μm (Figs. 1-2). Sporangia germinated directly. Repeated attempts to induce formation of zoospores in fresh water failed.

Holotype: Living subculture of holotype: deposited with American Type Culture Collection, Rockville, Maryland USA (ATCC) 20693.

Direct microscopical observations of smears of infested soil (Stanghellini and Hancock, 1971) revealed two types of propagules: i) spherical thin-walled spore, ca. 20 μm in diam, which resembled P. ultimum sporangia (Stanghellini and Hancock, 1971); ii) spherical, thick-walled spores, ca. 19 μm in diam, which resembled P. ultimum oospores. Upon plating of infested soil on the selected medium, only the thin-walled propagules germinated. No zoospores were produced in water culture.

Temperatures for radial growth on V-8 juice agar were 7 C, optimal 34 C and maximal 42 C. Daily growth rate at 25 C was 14 mm and at 37 C was 10 mm.

Pythium nunn shares many characters with P. vexans de Bary: a rosette habit of growth in culture, delicate hyphal branching, long and inflated and antheridial stalk, aplerotic oospores, lack of zoospores, and an optimal temperature for hyphal growth of ca. 34 C. The sizes of oogonia, oospores, sporangia and antheridia also are similar to P. vexans. However, P. nunn is clearly distinguished from P. vexans in the number and morphology of antheridia attached to a mature oogonium. Whereas, P. vexans usually has one antheridium per oogonium and rarely two (de Bary, 1876) almost half of the oogonia of P. nunn had two to five antheridia attached to them. Middleton (1943) and Van der Plaats-Niterink (1981) described a typical antheridial cell of P. vexans to have a bell-shaped apex broadly applied to the oogonium. A typical antheridial cell of P. nunn is apically applied and the apex of the crook-necked or club-shaped cell is rounded. Another morphological character that separates P. nunn from P. vexans is the shape of hyphal swellings. Whereas those of P. vexans are obpyriform, ovoid or, less commonly, spherical (Middleton, 1943; Matthews, 1931), hyphal swellings of P. nunn generally were spherical, oval or lemon shaped. In addition, the maximal temperature for hyphal growth of P. vexans is 34 C (Middleton, 1943) or 35 C (Van der Plaats-Niterink< 1981), whereas P. nunn grew at 42 C.

ACKNOWLEDGEMENTS

We thank Brent Reeves of Colorado State University (CSU) for useful advice and assistance in developing the taxonomy of P. nunn. Earl Rupple (USDA-ARS) and Gary McIntyre of CSU reviewed the manuscript and offered helpful suggestions. D. J. Mitchell (University of Florida, Gainesville, FL) and J. G. Hancock (University of California, Berkeley, CA) also reviewed the manuscript. Research supported by funds from Science and Education Administration project 83-CRCR-1-1259, BARD Research Project US-290-80 and Western Regional Project W-147.

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MYCOTAXON

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A NEW MYROTHECIUM FROM JAPAN, A RHIZONIC ACID PRODUCER

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SUMMARY

A new soil-borne species of *Myrothecium*, known as a producer of rhizonic acid, is described and given the name *Myrothecium penicilloides*. It is characterized by yellow-green sporodochia surrounded by yellowish brown to orange-brown, divaricately branched sterile hyphae, biverticillately branched conidiophores, and small, ovoid conidia.

Recently, a fungus, isolated from soil in Japan and tentatively identified as *Myrothecium* sp., was sent to the Hoshi College of Pharmacy (Tokyo) for chemical studies on fungal metabolites. The study resulted in rhizonic acid, which is partially structured of lichen depsides and depsidones, being isolated for the first time from a natural origin as a secondary metabolite (Tsuda et al., 1980). Recent reports indicate that mycobiont moieties of lichens and free fungi are capable of complete synthesis of depsidones: salazinic acid is produced by the fungal symbiont of the lichen *Ramalina crassa*, yasimin is produced by *Aspergillus unguis* and mollicellins by *Chaetomium* species (Stark et al., 1978; Sekita et al., 1981). In respect to biosynthesis of lichen substances, rhizonic acid production by *Myrothecium* sp. is interesting. A survey of the literature revealed that myrochromanone (Tamm et al., 1972), a metabolic product of *Myrothecium roridum*, is an another compound relating structurally to the lichen substances.

A comparison with other *Myrothecium* species showed this isolate to be a new species and it is described here as *M. penicilloides* Udagawa & Awao.

Myrothecium penicilloides Udagawa & Awao, sp.nov. Figs.1-4.

Coloniae in agaro "potato-carrot" modice effusae, tenues, e mycelio vegetativo submerso et mycelio aerio sparso compositae, plus minusve floccosae; sporodochia sparsa vel irregulariter aggregata; capitula conidiorum primum viridi-flava vel herbacea, deinde atroveneta; reversum citrino-viride.

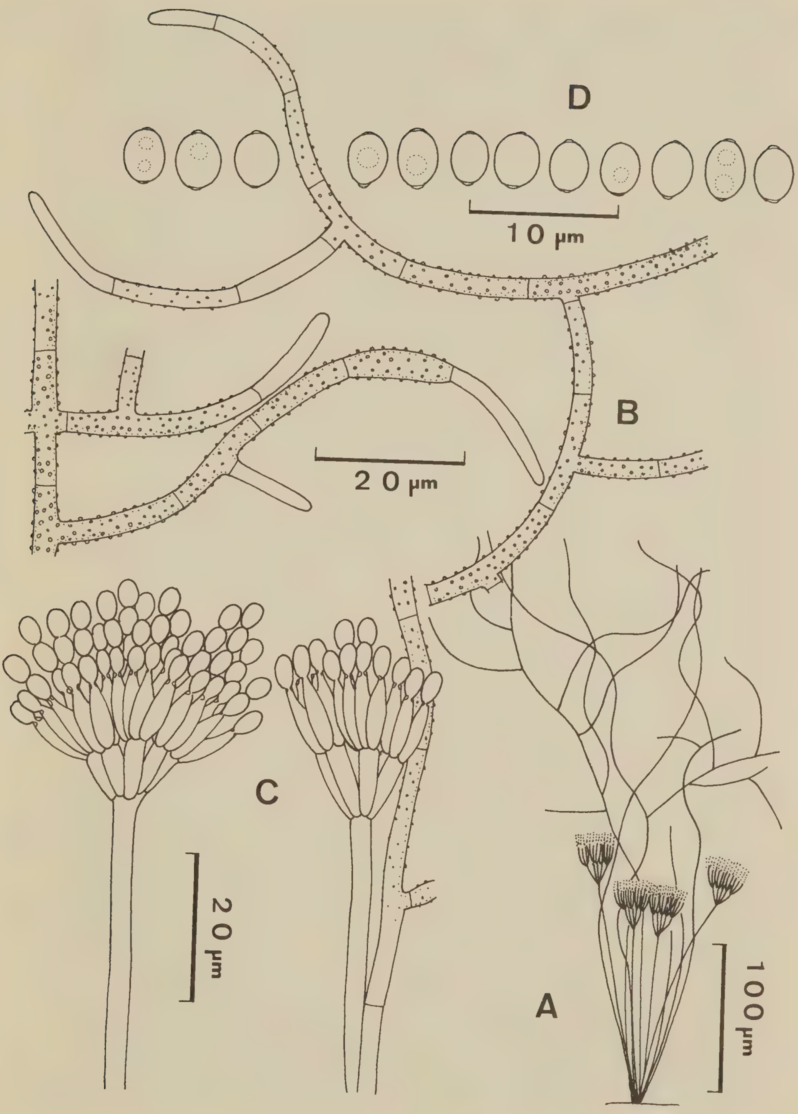
Mycelium immersum vel parte superficiale, ramosum, septatum, hyalinum, leve. Stroma nullum. Sporodochia discreta, aggregata vel saepe confluentia, sessilia, applanata, laxe contigua, 400-1000 x 250-400 µm. Hyphae steriles (marginales) ex hyphis basalibus oriundae, sinuosae, in rectangulo ramosae, minute vel conspicue incrustatae, septatae, flavo-brunneae vel aurantio-brunneae, in parte superiore saepe crispatae, usque 500-800 µm longae, 3-4 µm latae, ad apicem obtusatae. Conidiophora macronemata, mononemata sed interdum anastomosantia, parallela dense compacta, apice biverticillate ramosa, recta, levia, hyalina, 90-200(-340) x 2-3 µm. Metulae (4-)8-10 per verticillum, (6-)8-10 x 2-2.5 µm. Phialides 4-6 per verticillum, confertae, cylindricae, 10-12 x 2-2.5 µm, apice angustatae. Conidia hyalina vel dilute olivacea, in massa atroviridibus aggregata, ovoidea vel late ellipsoidea, 3-4 x 2.5-3 µm, levia, utrinque aliquantum acuminata, uni- vel biguttulata.

Holotypus: cultura NHL 2822 ex solo, Hiekawa, Nakaizu, Tagata, Shizuoka, in Japonia, in 25.ii.1973, a T. Awao, isolata. In collectione fungorum "National Institute of Hygienic Sciences (NHL), Tokyo, Japan".

Etymology: *penicilloides* = penicilloid, referring to appearance of the conidiogenous structure.

Colonies on potato-carrot agar growing rather rapidly, attaining a diameter of 3.3 to 3.4 cm within 10 days at 23°C, thin, with submerged vegetative mycelium and sparse aerial mycelium appearing more or less floccose; sporodochia scattered to irregularly aggregated; conidial heads in yellow-green shades from Greenish Yellow to Herbage Green (Rayner, 1970), then becoming Dark Bluish Green (Rayner); reverse Citrine Green (Rayner).

Mycelium immersed or partly superficial, branched, septate, hyaline, smooth-walled. Conidiomata sporodochial, separate, aggregated or often confluent, sessile, applanate but without a definite stroma, loosely packed as a knot of shorter celled hyaline hyphae 3-4 µm diam, 400-1000 x 250-400 µm; head consisting of a dark green mass of conidia surrounded by yellowish brown to orange-brown sterile (marginal hyphae, horny when dry with the sterile hyphae


D
10 µm
B
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C
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A
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Figure 1. *Myrothecium penicilloides*, NHL 2822. A. A portion of conidioma. B. Sterile hyphae. C. Conidiophores, metulae and phialidic conidiogenous cells. D. Conidia.

protruding. Sterile hyphae arising from the basal hyphae, and clothing the conidiophore surrounding the conidial mass at the apex, sinuous, branched at right angle, minutely to conspicuously roughened by numerous granules, septate, often curling in the upper part, up to 500-800 µm long and 3-4 µm wide, apice obtuse. Conidiophores macronematous, mononematous but sometimes anastomosed each other or with sterile hyphae, closely packed together to form the sporodochia, biverticillately branched above, straight, smooth-walled, hyaline, 90-200(-340) x 2-3 µm. Metulae in compact verticils of (4-)8-10, hyaline, smooth-walled, (6-)8-10 x 2-2.5 µm. Phialides (conidiogenous cells) in verticils of 4-6, compactly arranged, hyaline, cylindric, 10-12 x 2-2.5 µm, with apices narrowed into a conidium-bearing tube. Conidia hyaline to dilute olivaceous, dark green in mass, ovoid to broadly ellipsoid, 3-4 x 2.5-3 µm, smooth-walled, usually pointed at the both ends, uni- or biguttulate.

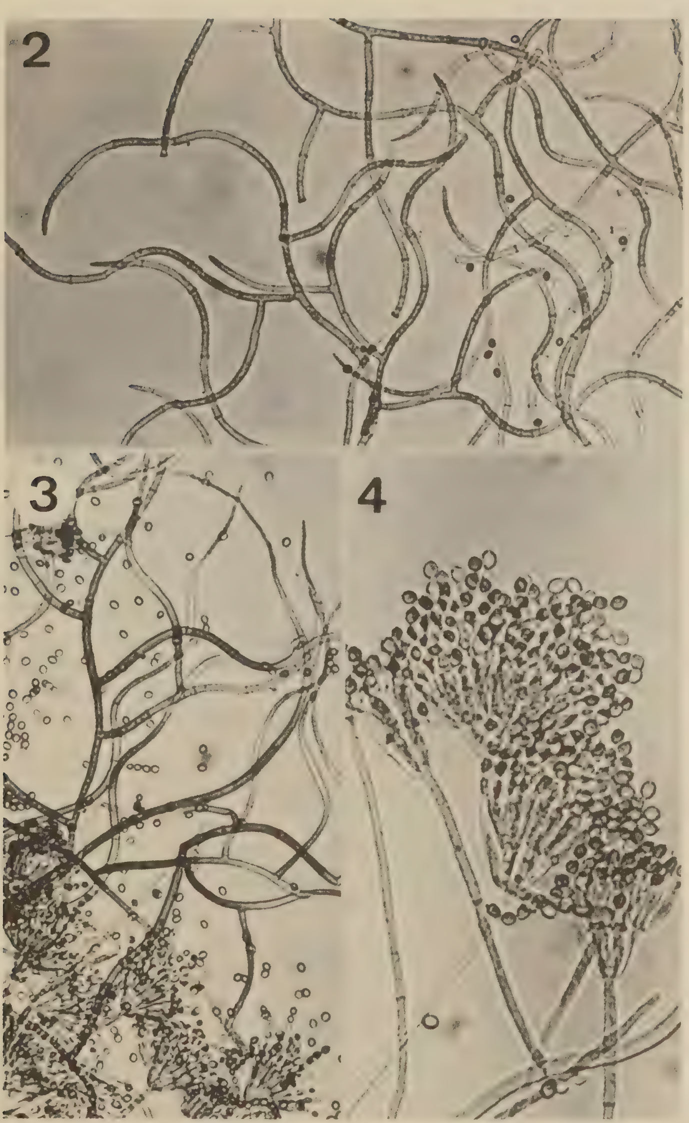
Colonies on potato-dextrose agar growing rapidly, floccose, white to variously colored, Pure Yellow, Peach, Rosy Vinaceous, or Greyish Green (Rayner, 1970), with reduced sporodochia; reverse Ochreous, Umber or Coral (Rayner).

At 37°C, growth is restricted.

Specimen examined: ex soil, Hiekawa, Nakaizu-cho, Tagata-gun, Shizuoka Pref., Japan, coll. T. Awao, 25.ii. 1973, No. 2822, NHL (Holotype).

The genus *Myrothecium* Tode (Tulloch, 1972) is characterized by small, discoid or cupulate, sessile or short-stalked, synnema-like sporodochial conidiomata bearing a mass of slimy, dark green to nearly black phialoconidia. The conidiophores are more or less erect in a compact layer (sometimes originating from a stroma), septate, hyaline or slightly olivaceous, repeatedly branched, with several branches being verticils of phialides. The genus is close morphologically to *Sarcopodium*: viz. both comprise sporodochial hyphomycetes forming conidia in slimy masses from densely aggregated phialides. In the latter genus, the hymenium is interspersed with often coiled, simple or branched, brown, mostly verrucose or echinulate setae (Ellis, 1976; Sutton, 1981). *Myrothecium bisetosum* described recently by Rao and de Hoog (1983) shows similarities to *Sarcopodium* in having sporodochia covered by a weft of emerald green, echinulate hyphae.

Myrothecium penicilloides is distinguished from all species of *Myrothecium* by the biverticillate-branching conidiophores which are loosely united together to form



Figures 2-4. *Myrothecium penicilloides*, NHL 2822. 2. Sterile hyphae, x 300. 3. A marginal portion of conidioma, x 300. 4. Conidiophores, metulae and phialidic conidiogenous cells, x 800.

sporodochia and by smaller, ovoid conidia. In addition, the sporodochia are clothed with yellowish brown to orange-brown, sinuous, divaricately branched, usually verrucose hyphae structurally resembling the setae of *Sarcopodium*. *Myrothecium penicilloides* is regarded as assignable in the genus *Myrothecium* due to the production of more regularly branched, penicillate conidiophores and the dark green color of its conidial mass. It is somewhat transitional in the direction of *Sarcopodium*.

Metarhizium Sorok., is also similar to *Myrothecium*, mainly differing by its dry subhyaline conidia compacted into regular chains and columns and non-marginate sporodochia. Nevertheless, Barron (1968) stated that "Usually, the spores of *Myrothecium* species tend to slime down to form gloeoid masses, but this is not always true, and I have recovered a number of isolates from soil in which the spores tend to remain in loose chains and aggregate in columnar masses, as in *Metarhizium*". In *Metarhizium*, there are two recognized species: *M. anisopliae* with cylindric conidia and colonies in many shades of green, sepia or isabelline; and *M. flavoviride* with ellipsoidal conidia, 7-9(-11) x 4.5-5.5 µm and grayish yellow-green to olivaceous buff colonies (Gams and Rozsypal, 1973; Tulloch, 1976). Although there seems little to distinguish *Myrothecium* from *Metarhizium* on a morphological basis (Barron, loc. cit.), *M. penicilloides* differs from both *Metarhizium* in producing distinct sterile hyphae and smaller, ovoid to broadly ellipsoid conidia.

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LULWORTHIA LIGNOARENARIA, A NEW MARINE PYRENOMYCETE FROM COASTAL SANDS

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Amongst the fungi collected on driftwood and associated sand grains along the coast of Jutland, Denmark was a **Lulworthia**-like species (Koch, **1974**: sub **Corollospora** sp.; Rees, Johnson and Jones, **1979**; Rees, 1982). We were unable to assign it to any species of marine fungi known to us because the filiform ascospores were septate, with terminal end chambers and the perithecia were carbonaceous. **Lulworthia** Sutherland has membranous perithecia, and filiform, non-septate ascospores with conoid end chambers containing mucilage (Koch and Jones, **1983**), while **Lindra** Wilson has filiform, septate ascospores but terminal end chambers that open to release mucilage are lacking (Koch and Jones, **1983**). However, Kohlmeyer (**1980**) described **Lulworthia lindroidea** as having septate ascospores, end chambers that are more flattened apically than those of other **Lulworthia** species and producing a drop of mucilage from the polar appendages. As the generic limits of the genus **Lulworthia** have been broadened to include **L. lindroidea** (Kohlmeyer, **1980**) we are now able to describe the **Lulworthia**-like species as a new species.

LULWORTHIA LIGNOARENARIA sp. nov. (Figs. 1-10)

Ascocarpi 350-405 µm lati, solitarii vel gregarii, globosi ad late ellipsoidei, carbonacei, nigri, cum subiculo, in granis arenariis. Collum conicum, 75-135 µm longum, ad basim 45 µm latum. Paries ascocarpi 3-6-stratus, cellulis externis magnis, ad 28 µm longis, lumina magna habentibus, cellulis internis compactis planis lumina parva habentibus. **Paraphyses** nullae. **Asci** 450-505 × 28 µm, octospori, unitunicati, leptodermi, clavati, pedunculati, mox deliquescentes, ex pulvino ad basim ascocarpi orientes. **Ascosporae** 409-436-472 × 6.0-6.5-8.0 µm, filiformes (scolecosporae), hyalinae, 31-38-septatae, cellulis mediis 5.0-9.9-14.0 µm longis, cellulis terminalibus 32.0-35.6-40.0 µm longis. Gutta mucilaginis ex cellula terminali exsudante. **Habitat** in granis arenariis una cum ligno. Holotypus **Lulworthia lignoarenaria**, Herb. J. Koch 398 (CP). Isotypus IMI 281466.

Ascocarps on grains of sand (rarely on wood and then superficial, not immersed), single or gregarious, spherical-broadly ellipsoidal, 350-405 µm high, subiculate-multisubiculate, carbonaceous and black. **Neck** conical 75-135 µm long, at base 45 µm in diam., pointing sideways or downwards and most often seated near basal subiculum. **Peridium** consisting of dark cells, 25-40 µm thick, outer 1-2 cells up to 28 µm high, 16 µm broad with large lumina. Outer cell wall distinctly domed reflecting light, inner layer compact consisting of a few layers of long flat cells with small lumina. When growing on sand grains a subiculum is formed consisting of outgrowths of cells 3-8 µm in diameter. Young ascocarps filled with thin-walled polygonal cells remaining longest at the base and in the periphery of the ascocarp. **Paraphyses** none. **Asci** 450-505 x 28 µm, eight-spored, clavate, tapering towards apex, pedunculate, thin-walled, early deliquescing, originating from a small pulvinus at the base of the ascocarp. Spores ejaculated from the neck, singly or a few at a time. **Ascospores** hyaline, filiform, scolecosporous twisted, multicelled with conical end chambers rupturing apically at maturity, releasing mucilage which forms a persistent hemispherical globule at the apex. Spores 409-436-472 x 6.0-6.5-8.0 µm (30 spores), number of cells (without end chamber) 32-36-39 (10 spores), cells measure 5.0-9.9-14.0 µm (20 cells, and end chambers 32.0-35.6-40 µm long (20 cells).

Culture (1658 CP) from ascospores on PDA moderate rapid growth at room temperature radius 24 mm in 3 weeks, colony black, grey/black. Advancing zone even and appressed, aerial mycelium raised, and submycelium well developed. Main hyphae in advancing zone very soon bluish-brown-coloured, septate, 4 µm in diameter, side branches thin, hyaline, forming abundant anastomoses. Aerial mycelium with brown/black little-branched main hyphae 4 µm in diameter, side branches hyaline, diameter 2-3 µm. Submersed mycelium as in advancing zone. Conidia and ascocarps not observed.

Substrate, driftwood/sand. The fungus colonizes driftwood deposited at base of white dunes. From the wood mycelium grows out into the sand binding the grains of sand together with substantial amounts of dark mycelium and ultimately fruiting in the sand several mm from the wood.

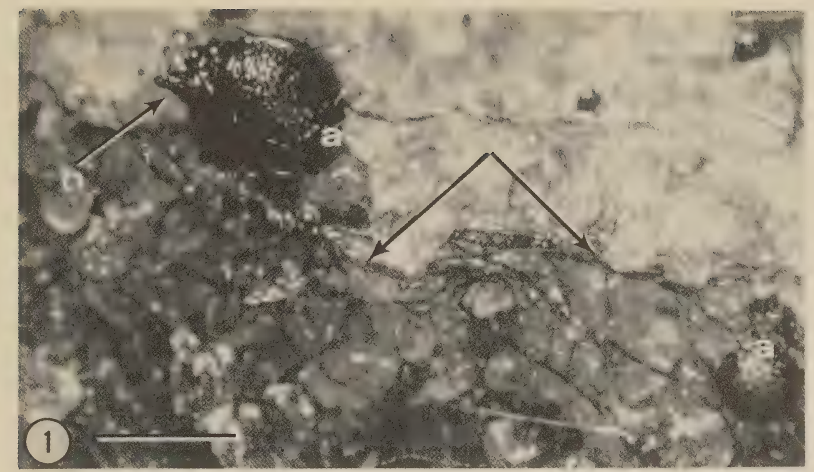
Holotype: Herb. J. Koch 398, slides 1-5 (CP), collected Jylland, Grønhøj, April 1981 and kept in humid chamber until December 1981.

Isotype: Slides 6-10 deposited in herb. CMI (IMI 281466).

Etymology: Latin **Lignum** = wood and **Arenarius** = growing on sand, in reference to the wood and sandy habitat of this species.

Specimens examined: Denmark, Jutland, Grønhøj 20.8.1967 **Picea**, J.K. 173;20.8.1967 **Betula**, J.K. 224; 26.8.1967 **Acer**, J.K. 152; 26.8.1967 **Quercus**, J.K. 225; 26.8.1967 hardwood, J.K. 226; 19.10.1967 **Pinus**, J.K. 171; 5.4.1969 softwood, J.K. 210; 5.4.1969 J.K. 227; 5.4.1969 softwood, J.K. 233; 5.4.1969 **Quercus**, J.K. 237; 5.4.1969 hardwood, J.K. 250; 5.4.1969 J.K. 251; 8.1969 hardwood, J.K. 172; 25.10.1970 J.K. 151; 25.8.1971 J.K. 188, 223; 21.3.1972 J.K. 232,

FIGS. 1-3. **Lulworthia lignoarenaria.** 1. Ascocarps (a) growing amongst the sand grains. Note lateral position of neck (arrowed n) and the extensive mycleium (arrowed) in the sand. 2. and 3. Sections through peridium with the outer cell domed (arrowed), inner layers of cells compact, with small lumina, subiculum (arrowed s) and thin-walled polygonal cells (p). Bar lines: 1 = 350 µm; 2-3 = 30 µm.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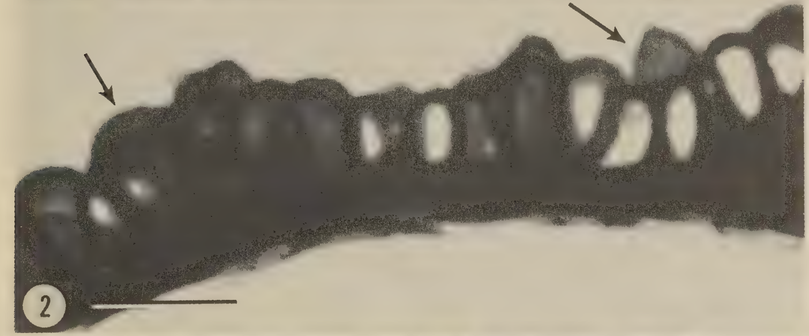
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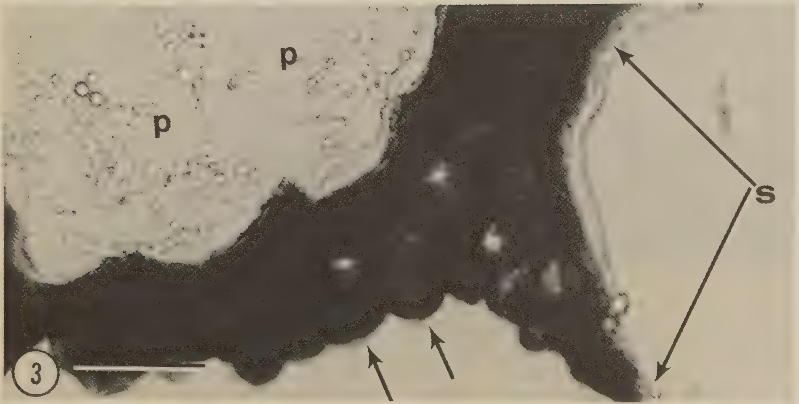
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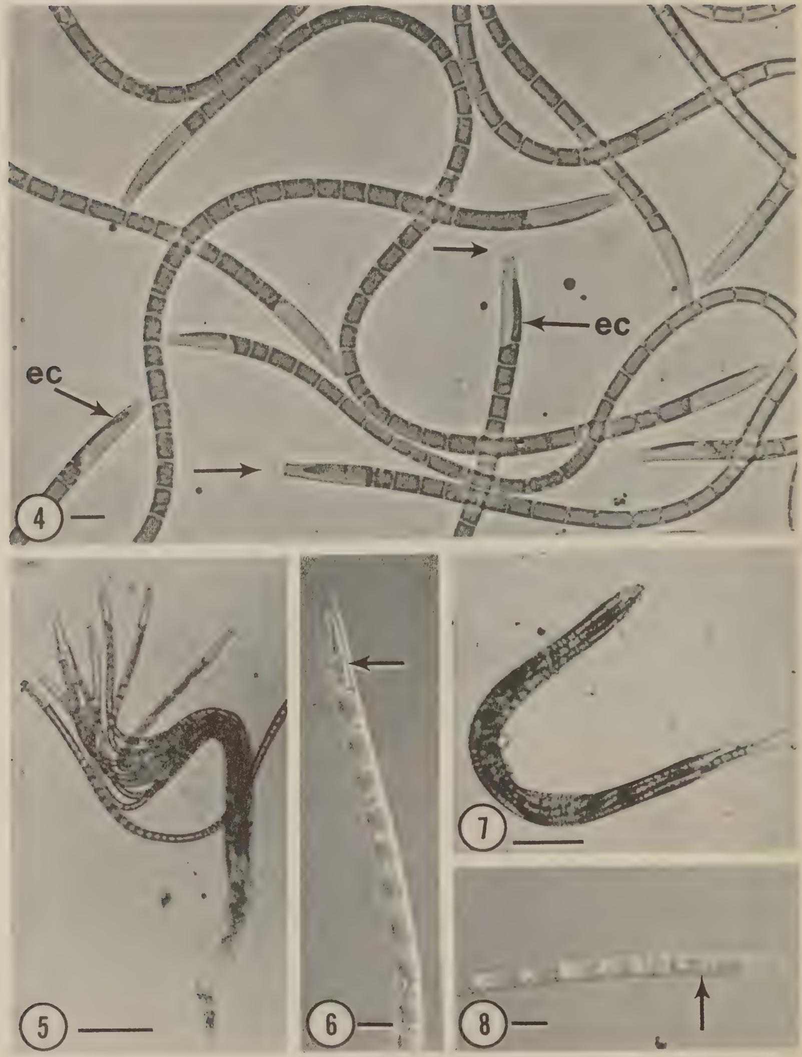
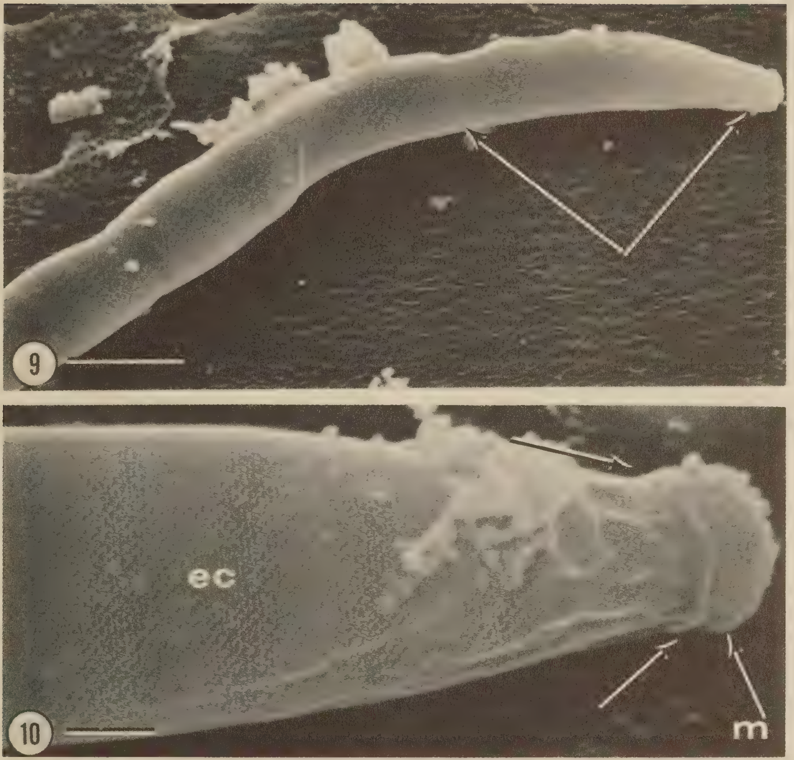


FIGS. 4–8. **Lulworthia lignoarenaria.** 4. Hyaline, septate, filiform ascospores with conical end chambers containing cytoplasmic residual material (arrowed ec) and with exuded drops of mucilage (arrowed). 5. Deliquescing ascus with uncoiling septate ascospores with prominent end chambers. 6,8. End chambers with cytoplasmic residual material within (arrowed). 7. Young ascus, thin-walled, tapering towards the apex and pedunculate. Bar lines: 4, 6, 8 = 15 µm; 5, 7 = 50 µm.



FIGS. 9-10. **Lulworthia lignoarenaria.** 9. Part of a septate ascospore with end chamber (arrowed) and drop of released mucilage. 10. Note flared tip (arrowed) of end chamber (ec) and drop of released mucilage (arrowed m). Bar lines: 9 = 10 µm; 10 = 2 µm.

244; 16.11.1975 softwood, J.K. 313; 16.11.1975 hardwood, J.K. 314, 315, 316; Jutland, Lyngby, 16.11.1975 softwood J.K. 318; Jutland, Vigsø 22.12.1975 J.K. 328; 22.12.1975, softwood, J.K. 341; Grønhøj 19.4.1981 softwood J.K. 398.

L. lignoarenaria resembles **L. lindroidea** but differs in the following respects:

	L. lignoarenaria	L. lindroidea
Form ascospore	spiralled	curved
Length ascospore	400-470 µm	170-240
Number of cells	32-39	9-12
Single cells	10-14 x 9 µm (ratio 1.3:1	not given, but ratio 8:1
Endcell	conical	very nearly cylindrical
Ascocarp	350-400 µm high, 330 µm diam.	150-220 µm high, 250-450 µm diam.
Ascocarp	carbonaceous	coriaceous
Ascocarp	not immersed in wood	partly immersed in wood
Fruiting	on grains of sand	on wood

L. lignoarenaria ascospores differ from other described **Lulworthia** species in that there is usually residual cytoplasmic laterial left behind in the end chamber (Figs. 6, 8) and there is a distinct collar formed at the tip of the end chambers. Kohlmeyer and Kohlmeyer (**1979**) state that the genus **Lulworthia** "is in critical need of revision" and we would concur with that view. Fifteen species have been described but Cavaliere and Johnson (**1966**) placed 13 species and 2 varieties in the one species **L. medusa** (Ellis & Everh.) Cribb & Cribb.

Booth (**1983**) places 3 species in the genus **Lulworthia: L. lindroidea, L. kniepii** and **L. medusa,** the latter with 4 varieties: **L. medusa** var. **apiculata, L. medusa** var. **fucicola, L. medusa** var. **halima, L. medusa** var. **medusa.** We do not accept these views and recognize the following species: **L. floridana** Meyers, **L. fucicola** Suth., **L. grandispora** Meyers, **L. kniepii** Kohlm., **L. lignoarenaria** Koch & Jones and **L. lindroidea** Kohlm.

L. lindroidea and **L. lignoarenaria** differ from other **Lulworthia** species in a number of respects. They have septate ascospores, coriaceous to carbonaceous perithecia, and the end chambers may contain residual cytoplasmic material. These differences may be sufficient to place them in a new genus, however this is not proposed until studies on ascocarp development and the ultrastructure of the ascospores have been completed. The delineation of the genera **Lindra** and **Lulworthia** will be cconsidered in greater detail in a subsequent paper.

Lulworthia lignoarenaria is similar to a species illustrated as **Lindra** sp. by Tokura (**1982a,b, 1983**) and Tokura, Shimooka, Moriguchi, Yagi, Nakanishi and Nakagawa (**1982**) from Northeast of Hokkaido, Kyushu and Nansei Islands, and other sites around the coast of Japan. Tubaki and Nakagiri (**1982**) have also reported a similar fungus in their collections from Japan.

This fungus is frequently collected on sand grains associated with wood in that Rees, Johnson and Jones (**1979**) reported its frequency of occurrence as 6.8%, Koch (**1974**) as 4.6% while in a recent survey Farrant, Hyde and Jones (unpublished) found it to be present in 17.0% of their collections from the Grønhøj region of Jutland. Tokura (**1982b**) reported 143 collections of the fungus from 19 stations, with a percentage occurrence of 9.7, from localities in Japan. Clearly the fungus along with **Arenariomyces trifurcatus, Carbosphaerella leptosphaerioides, Corollospora lacera, C. maritima, Crinigera maritima, Kohlmeyeriella tubulata** and **Nereiospora comata** forms a characteristic part of the arenicolous fungal flora of coastal dune systems. **Lulworthia lignoarenaria** is considered a marine species with a strong affinity to the beach and coastal water habitat. Its adaptation to sand-inhabiting conditions is exemplified by 1) its ability to bind and secure sand grains and wood with profuse production of mycelium, 2) the formation of secondary subicula on neighbouring sand grains, 3) perithecia that are carbonaceous and 4) the downward direction of the papilla neck when growing attached to sand grains. It shares these characteristics with other arenicolous marine fungi, in particular **Corollospora lacera, C. maritima, C. pulchella** and **Kohlmeyeriella tubulata.**

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A NEW OBLIGATE AZYGOSPORIC SPECIES OF RHIZOPUS

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SUMMARY

Rhizopus azygosporus sp. nov. is described and illustrated. It is characterized by the abundance of azygospores in the complete absence of true zygospores. The type culture ATCC 48108 was isolated from tempeh which is a solid fermented soybean product that is consumed widely in Indonesia.

In the course of our current investigation into sexuality of the genus **Rhizopus** Ehrenberg, hundreds of strains maintained in the American Type Culture Collection (ATCC), including strains obtained from the Centraalbureau voor Schimmelcultures in the Netherlands, the Commonwealth Mycological Institute in England, the Faculty of Agriculture, Hokkaido University in Japan, the Food Industry Research and Development Institute in Taiwan, the Institute for Fermentation in Japan, the Institute of Microbiology, Academia Sinica in China and the Northern Regional Research Center, USDA in Illinois, were mated in all combinations on potato dextrose agar (PDA) plates for formation of zygospores. Of the strains that failed in mating tests, ATCC 48108 was characterized by the abundance of azygospores, while zygospores were wholly lacking. Thirty single-spore cultures derived from the strain ATCC 48108 freely produced obligate azygospores, thus azygospore formation is a stable characteristic of the fungus.

ATCC 48108 was originally isolated by J.N. Hedger in Bogor, Java, in 1976 from tempeh which is a solid fermented soybean product that is consumed widely in Indonesia. It was deposited at ATCC by G. Harris in 1982 as **Rhizopus oligosporus** Saito and is also available in the Department of Botany and Microbiology, University College of Wales, Aberystowyth, Dyfed, UK, for production of tempeh described in the **Sourcebook of Experiments for the Teaching of Microbiology** (3).

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In the Mucorales, there are only four well established species which are known to produce obligate azygospores in the complete absence of true zygospores. These are **Mucor ardhlangiktus** Mahrotra et Mehrotra (4), **M. azygosporus** Benjamin, **M. bainieri** Mehrotra et Baijal (1) and **Absidia spinosa var. azygospora** Boedijn (2). Since ATCC 48108 represents the first obligate azygosporic strain found in the genus **Rhizopus,** it is herein described as a new species.

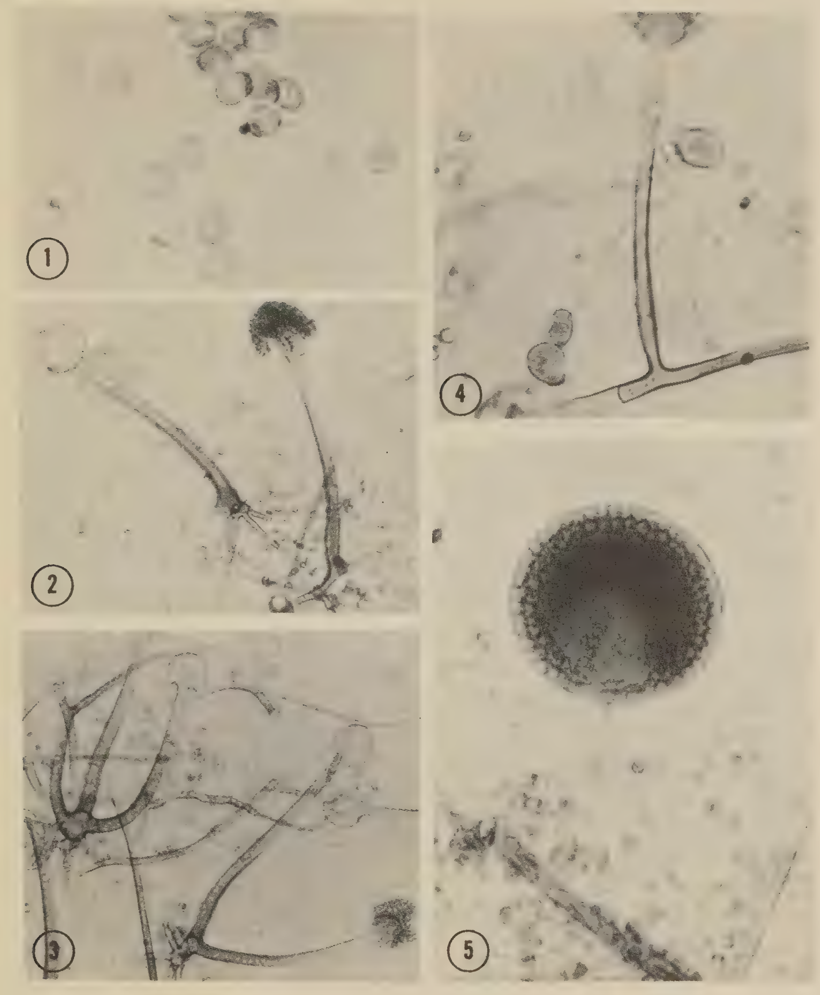
Rhizopus azygosporus Yuan et Jong, sp. nov.

Coloniae in agaro PDA (25 C) albae, in aetate fuscis; sporangiophoris hyalinis, levibus, rectis vel ascendentibus, ad 500 μ altis, 6-14 μ diam; sporangiis fusco-nigris, globosis, subglobosis, 35-100 μ diam (med. 65μ); columellis subglobosis, ovoideis, vel pyriformibus, hyalinis, levibus, 10-18 C 12-22 μ; sporangiosporis hyalinis, levibus, ovoideis, vel ellipsoideis, 4-7 μ diam; chlamydosporis in hyphis vegetantibus numerosis, singulis vel in catenis gestis, globosis vel subglobosis, de muris tenuibus; zygosporis absentibus; azygosporis terminalibus vel subterminalibus in hyphis vegetantibus numerosis, globosis vel subglobosis, aurantio-fuscis vel fusco-nigris, 25-70 μ diam. Typus ATCC 48108.

Colonies on PDA at first white with sterile aerial mycelia, becoming grayish black in age, turf dense, composed of sporangia, chlamydospores and azygospores; sporangiophores smooth, erect or ascending, 6-14 μ in diam and up to 500 μ in length, hyaline to brown (Figs. 2,3,4); sporangia grayish to black, globose to subglobose, 35-100 μ in diam (average 65μ), wall smooth, rapidly deliquescent (Fig. 5); columella subglobose, oval or pyriforme, hyaline to pale brown, smooth, 10-18 x 12-22μ; sporangiospores hyaline, globose, ovoid or ellipsoid, 4-7 μ in diam, smooth, but marked with faint striations (Fig. 1); chlamydospores variable in size, intercalary or terminal, single or in chain, thick-walled, subglobose, oval, cylindrical to irregular (Fig. 4); zygospores never formed; azygospores abundant, produced terminally or subterminally, sometimes one or more on the same swollen end of a simple azygosphore, globose to subglobose, pale brown to dark brown, 15-70 μ in diam, including the coarse conical exospore projections Figs. 6-11).

Comparison of cultures grown under various conditions demonstrates that **R. azygosporus** grows on a variety of media at temperatures from 15 to 45 C, but produces sporangia and azygospores at temperatures from 25 to 37 C. Glucose-yeast-peptone agar (ATCC medium 1049) appears better than PDA in production of azygospores. Azygospore formation commences within 2 days and is equally good in complete darkness and in diurnal alternation of darkness and light.

Rhizopus azygosporus has been compared with more than ten strains of **R. oligosporus** which were isolated from tempeh. On a variety of media, these two species differ principally on the basis of azygospore production and sporangiospore size. In **R. oligosporus,** azygospores are never produced and sporangiospores are 5-18 in diameter as against 4-7 in **R. azygosporus.**



Figures 1-5. **Rhizopus azygosporus** ATCC 48108. 1. Sporangiospores. **ca.** × 1,000. 2-4. Sprangiophores and rhizoids. **ca.** × 100. 5. Sporangia. **ca.** × 450.

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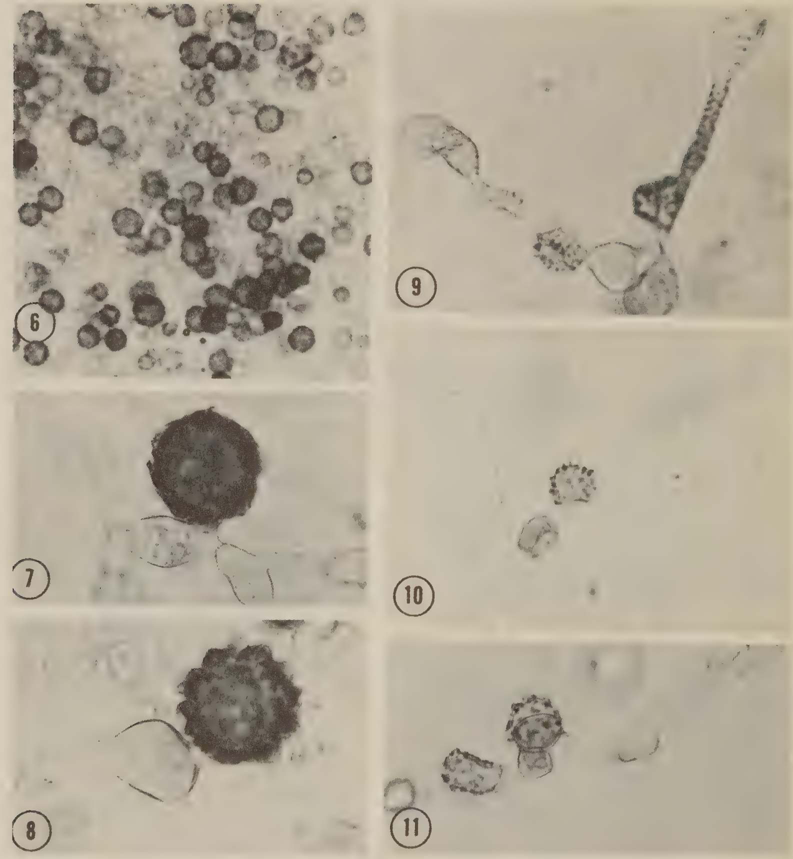

Figures 6-11. **Rhizopus azygosporus** ATCC 48108. 6-8. Mature azygospores. 6. **ca.** X 100. 7-8. **ca.** X 450. 9-11. Formation of azygospores by aggregation of protoplasm with granulars. **ca.** X 450.

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DIATRYPACEAE IN THE PACIFIC NORTHWEST

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SUMMARY

Biologic and taxonomic aspects of diatrypaceous fungi are discussed, and keys and descriptions presented for 28 species known from the Pacific Northwest. When known, both teleomorphic and anamorphic data are presented for each species. Morphologic features of representative species are illustrated. **Diatrype macounii** Ell. & Everh. is regarded as a synonym of **Diatrype bullata** (Hoffm. : Fr.) Fr. **Diatrype hullensis** Ell. & Everh. and **Eutypella virescens** Wehm. are relegated to synonymy with **Eutypa flavovirens** (Pers. : Fr.) Tul. **Diatrype stigma** (Hoffm. : Fr.) Fr. is tentatively divided into five "Collection Groups" pending further research which likely will result in dividing it into several species. A host-fungus index for the Diatrypaceae in the Pacific Northwest is presented.

INTRODUCTION

Members of the Diatrypaceae (Ascomycetes, Pyrenomycetes, Sphaeriales) are common throughout the world, occurring mostly on dead or declining woody angiosperms. Several species are known plant pathogens and many others will probably be shown to be pathogenic. Despite the widespread occurrence of its members, few studies have been done on the Diatrypaceae, partly because of taxonomic and nomenclatural problems in the family.

Many names applied to these fungi are nomenclaturally old, and in numerous instances they have been questionably applied. Taxonomic literature on the group is scattered and often difficult to obtain. Within the Pacific Northwest no comprehensive effort has been made to collect, identify, and classify these fungi. For these and other reasons, identification of Diatrypaceae from this region has been difficult, impeding research on other aspects of their biology.

This paper reports the results of a taxonomic study of Pacific Northwest species of Diatrypaceae. For our purposes, the Pacific Northwest was taken to include Idaho, Oregon, and Washington. Approximately 300 collections were examined. For the reasons indicated, it was not always possible to categorically identify collections to species. In addition, type collections of only a few species were seen. Thus, this study is only a first step toward a better understanding of the Diatrypaceae in the Pacific Northwest.

This paper is divided into the following sections: I. Materials and Methods; II. Biological Aspects; III. Taxonomic Characters and Criteria; IV. Descriptive Section; V. Fungus-Host Index and Host-Fungus Index.

I. MATERIALS AND METHODS

Stromatal features were studied under a stereoscopic microscope. Materials for examination with a compound microscope were prepared by mounting perithecial fragments or conidial material in water. Melzer's reagent was used to assess amyloid reactions of apical ascus rings.

Cultures were started by soaking stromata in water for 3 h, blotting them dry, and placing them in inverted Petri plates containing Difco potato dextrose-agar (PDA) amended with 5g/l Difco yeast extract (PDYA). Stromata usually discharged ascospores upward onto the agar within 24 h. Masses of ascospores were used to start colonies which were then transferred to PDA. Unless otherwise noted, information on anamorphs in culture is based on PDA cultures, grown under fluorescent lighting. Conidiogenous cells were studied by differential interference microscopy, and sometimes by scanning electron microscopy or transmission electron microscopy (Glawe and Rogers, 1982a, b).

A complete list of the collections studied may be found elsewhere (Glawe, 1982). To conserve space, authorities for fungal taxa usually are cited only in the

Descriptive Section. Authorities for host species are cited only in the Host-Fungus Index.

Abbreviations of classical taxonomic works follow Hawksworth (1974).

II. BIOLOGICAL ASPECTS

Little is known about the biology of diatrypaceous fungi. Most studies on biological aspects have dealt with **Cryptosphaeria populina**, **Eutypa armeniacae**, or **Eutypella parasitica**, which are plant pathogens. **Eutypa armeniacae** is the best known, having been the subject of many studies throughout the world. Even this fungus, however, is poorly understood. The following summarizes what is known of the biology of diatrypaceous fungi.

LIFE HISTORIES: In many respects, diatrypaceous life cycles appear similar to those of other pyrenomycetes. The mycelium inhabits wood or bark, usually of woody angiosperms, where it grows saprophytically after the host's death. Conidia typically are the first spores to be produced, and are generally borne in a slimy matrix, suggesting that they are dispersed by rain, and perhaps insects. The sexual state usually forms following the asexual state, and in most species the two states have not been found together in nature. Perithecia develop within stromata and exhibit characteristics of the **Xylaria**-type centrum. Asci arise from croziers. No thorough, modern developmental study has been made in the family, and consequently, details concerning fertilization, ascus cytology, etc., are unknown. Ascospores are forcibly discharged and apparently are air-borne to new substrata.

ASEXUAL STATES (ANAMORPHS): Conidia usually are produced from conidiogenous cells aggregated into enclosed or open conidiomata, but hyphomycetous anamorphs are known (Glawe and Rogers, 1982b; Saccardo, 1882; Tulasne and Tulasne, 1863). The conidiomata may be pycnidium-like structures (e.g., Carter, 1957; Kliejunas and Kuntz, 1972), open, furrow-like structures (Tulasne and Tulasne, 1863), or acervulus-like structures (Messner and Sutton, 1982). Conidia typically are produced in yellow, orange, or whitish-colored masses from percurrently or sympodially proliferating conidiogenous cells (Glawe and Rogers, 1982a, b; Messner and Sutton, 1982; Sutton, 1980). Conidia are hyaline, single-celled, and range in shape from allantoid to cylindrical or filiform, and from nearly straight to strongly curved. **Cytosporina** Sacc. has been used for species with pycnidial conidiomata and filiform conidia,

Libertella Desm. for those with unenclosed conidiomata and filiform conidia, and **Naemospora** Pers. for species with unenclosed conidiomata and allantoid conidia. Some species, however, have anamorphs with variable conidiomata, complicating classification of the anamorphs (see Glawe, 1984). We have not assigned anamorphs to form-genera because their limits are unclear.

One of the great mysteries of diatrypaceous fungi is the function of the conidia. Although the Tulasne brothers (1863) reported germination of conidia of **Eutypa lata**, subsequent attempts to germinate diatrypaceous conidia have failed (Glawe and Rogers, 1982b, and references therein). Conidia often produce germ-tube-like structures (Glawe and Rogers, 1982b; Moller and Kasimatis, 1978; Rogers and Glawe, 1983), but since the Tulasnes' report have not been observed to result in mycelia. Thus, some researchers have suggested that conidia might not function in dispersal (e.g., Moller and Kasimatis, 1978). Diatrypaceous conidia have been thought by some to function as spermatia (see de Bary, 1887), but conclusive evidence for this is lacking.

SEXUAL STATES (TELEOMORPHS): Most observations on diatrypaceous fungi in nature are made on teleomorphs since they tend to be more conspicuous and hence collected more frequently than anamorphs. Perithecia contain paraphyses and periphyses in addition to asci. The perithecia are embedded in stromata which may be well-developed, as in **Diatrype** and **Diatrypella**, or more or less reduced, as in the other genera. In all genera the stromata likely aid in conserving moisture. In **Diatrype** and **Diatrypella**, and sometimes in certain species of other genera, stromata also are involved in ascospore discharge by piercing or rupturing the host's bark so that perithecial ostioles are exposed. Stromata may function in this fashion either by pushing directly through the bark, or, in at least one species, by producing peg-like structures which push the bark away (see discussion of **Diatrype stigma** collection group 3 herein). Bipartite stromata (Wehmeyer, 1926) also occur in the family. In this type of stroma, which is often difficult to detect, two layers form within the host's bark and are separated by a gelatinous zone of tissue which allows the outer layer to peel away, lifting the host's bark from the stroma.

Diatrypaceous asci are clavate- to spindle-shaped, long-stipitate, and have apical invaginations which are connected to the ascospore masses by cytoplasmic strands. Following moistening of stromata the asci absorb water, and the slender, elastic ascus bases become greatly elongated.

The ascospore masses are held near the ascus apices by the connecting cytoplasmic strands while the asci elongate until they reach the perithecial ostiolar openings. At this point the elastic bases cannot stretch further, and pressure builds within each ascus until the invaginated apex everts and the mass of ascospores is expelled into the air, sometimes for several millimeters. Thus, the ascus apex functions as a "pressure release valve." The discharged ascospores are bound together by cytoplasmic remnants from the ascus, and adhere in a mass while air-borne. Upon striking a surface they are dispersed in free water(see Carter, 1957). Thus, the morphological features associated with diatrypaceous asci (the long stipe, invaginated apex, the cytoplasmic strand connecting the spore mass to the apex, and the mass of ascospores embedded in cytoplasm) all play important roles in spore discharge.

SEXUALITY: There is no published information on the genetics of any diatrypaceous fungus. Probably little interest will be shown in the genetics of the Diatrypaceae as long as it is not possible to obtain teleomorphs in artificial culture. Croxall (1950) found that single-ascospore cultures of British **Diatrypella** species produced teleomorphs when inoculated onto host material, suggesting that those species are homothallic.

PHYSIOLOGY: Cryptosphaeria populina (Hinds, 1981) and **Eutypa armeniacae** (English and Davis, 1978) have been shown to decay wood, and it seems likely that many, if not all Diatrypaceae cause physiological white rots. Moller and Kasimatis (1978) hypothesized that **Eutypa armeniacae** produces a translocatable toxin which acts on its hosts, since the fungus infects stems and is not present in tissue where characteristic foliar symptoms occur. Many species require light for sporulation in culture, while some do not. This characteristic has been used to help separate **E. armeniacae**, which requires light for sporulation, from species which do not (Glawe **et al.**, 1982, 1983).

PATHOLOGY: Diatrypaceous fungi typically are found on dead or declining hosts, suggesting that many are at least somewhat pathogenic (**e.g.**, Carter, 1941; Tiffany and Gilman, 1965). It is surprising that only three species have been proven pathogenic to their hosts, but this probably is because diseases caused by Diatrypaceae tend to be unspectacular diebacks or cankers. In some instances diseases caused by Diatrypaceae have been confused with those caused by other fungi. A classic example is the Eutypa dieback disease of grapevines, which until recently

(Moller and Kasimatis, 1978) was confused with a foliar and fruit disease caused by **Phomopsis viticola** Sacc.

Eutypa armeniacae is the best known plant pathogen in the family. It has been studied since the 1930's when its anamorph, an unnamed **Cytosporina** species, was shown to cause a dieback disease of apricot (**Prunus armeniaca** L.) (Carter, 1957, and references therein). The teleomorph was described in 1957 (Carter, 1957). Ascospores are thought to constitute disease inoculum (Moller and Kasimatis, 1978) since conidia have not been observed to germinate. An unusual feature of this fungus is that the teleomorph apparently does not form in regions of less than about 33 cm of annual rainfall, although plants infected with the fungus often occur in such regions. Long-distance dispersal of ascospores is thought to occur in such situations (Carter, 1957; Glawe **et al.**, 1982; Ramos **et al.**, 1975). The fungus causes cankers and diebacks of its hosts, which include several economically important plants (Carter and Talbot, 1974; Moller and Kasimatis, 1978), and it ranks among the most important pathogens of apricot and grapevines in various parts of the world. Isolates have been shown to differ in virulence on apricot (Glawe **et al.**, 1982; Ramos **et al.**, 1975). The fungus is capable of sustained saprophytic growth on killed hosts (e.g., Carter, 1957), and is known only as a saprophyte from a number of hosts (Carter and Moller, 1977; Carter and Talbot, 1974).

Eutypella parasitica was described as the cause of a canker disease of **Acer** spp. in 1938 (Davidson and Lorenz, 1938). The fungus occurs in North America east of the Rocky mountains, and is an important pathogen in the Lake States.

Cryptosphaeria populina recently was shown to cause a canker disease and wood decay of **Populus** spp. (Hinds, 1981). The fungus, first described from Europe, appears to be common throughout North America.

HOST RANGES AND GEOGRAPHICAL DISTRIBUTIONS: Diatrypaceous fungi differ greatly in their host ranges. Many species seem to be specific for one host genus. For example, **Diatrypella betulina** is known only from **Betula**, **Cryptosphaeria populina** only from **Populus**, etc. Other species have broader host ranges. **Diatrype bullata** is known from several host genera, and **Eutypa flavovirens** is known from numerous host genera in several families.

Diatrypaceous fungi also differ greatly in their geographical distributions. For example, **Diatrypella betulina** is known only from North America, **Eutypella parasitica** only from eastern North America, and **Cryptosphaeria populina** from both North America and Europe.

Some species, such as **Eutypa flavovirens** and **E. armeniacae** have world-wide distributions. In general, species with wide host ranges often appear to have greater geographical distributions than species limited to one host genus.

EVOLUTION: Wehmeyer (1926) attempted to trace phylogenetic lines in the Diatrypaceae and other stromatic Sphaeriales, and his taxonomic treatments of these fungi reflected his beliefs regarding their evolution. However, there is little evidence to support some of his conclusions. For example, Wehmeyer (1926) regarded Diatrypaceae with multispored asci to represent a line phylogenetically distinct within the family. It seems likely, however, that the change from eight-spored to multispored asci (assuming the fungus or fungi ancestral to present-day Diatrypaceae were eight-spored) could be relatively easily made, and thus multispored species might have evolved independently and repeatedly, as they have done in other groups. Wehmeyer did not address this problem.

The lack of a fossil record of diatrypaceous fungi, along with the dearth of knowledge about most existing diatrypaceous fungi, makes it impossible to do more than speculate about the evolution of this group. In general, the Diatrypaceae appear most similar to the Xylariaceae (Pyrenomycetes, Sphaeriales) and the Diaporthales. On the basis of similarities in centrum type, conidial state morphology, and host relationships (see Rogers, 1979), the Diatrypaceae seem more closely related to the Xylariaceae than to members of the Diaporthales. The many differences between the Xylariaceae and Diatrypaceae suggest that the two families diverged long ago.

There is little evidence to suggest how evolution has progressed within the Diatrypaceae. Certainly, the many morphological similarities of these fungi suggest that they are closely related. Morphological data alone, however, are probably insufficient to discern reliably phylogenetic lines (see Davis and Heywood, 1973). Meaningful studies on the evolution of the Diatrypaceae will not be possible until more is known about all aspects of their biology.

III. TAXONOMIC CHARACTERS AND CRITERIA

Several different approaches to classifying diatrypaceous fungi have been developed. Saccardo's (1882) treatment of the family resembled that of Nitschke (1867), emphasizing stromatal morphology in addition to microscopic characteristics. Wehmeyer (1926) attempted to distinguish phylogenetic lines, and incorporated his ideas on phylogeny into his taxonomic arrangement of the family. Croxall (1950) regarded stromatal morphology as too variable to be used to distinguish taxa, emphasizing instead microscopic features, especially ascospore size. Tiffany and Gilman (1965) utilized some of the concepts of Wehmeyer (1926) and Croxall (1950) and emphasized microscopic characteristics in distinguishing species.

The taxonomic approach developed during this study makes use of findings resulting from each of the above studies. However, our taxonomic arrangement differs from all of them to some extent, and in some respects is more similar to Nitschke's treatment (1867) than to those of more recent authors. The following discussion deals with taxonomic concepts at the family, genus, species, and infra-specific levels. These concepts are based primarily on studies of Pacific Northwest species.

FAMILY LEVEL: Features used in distinguishing the Diatrypaceae from other families include the following:

1. Embedded perithecia. Perithecia are never superficial or unenclosed, but always are embedded in stromata consisting of fungal tissue or a mixture of fungal and host tissue.

2. Ostiolar ornamentation. Perithecial ostioles are usually sulcate (furrowed), but some species lack sulcations. Sulcations range from well-developed, easily discernible structures to rudimentary.

3. Ascus morphology. Asci are clavate to spindle-shaped, long-stipitate, and include a characteristic apical apparatus (see also Schrantz, 1960), which consists of a refractive apical invagination (Figs. 1, 2) terminating in a minute apical ring. In addition to these more typical ascus structures, some **Eutypella** species have a "bowl-shaped" structure near the ascus apex; such a structure is seen in medial optical section in Fig. 33. In some species of Diatrypaceae the ring is blued in Melzer's reagent while in others it remains unreactive (see also Rappaz, 1983). In some species ascal rings among or within collections vary in their reactions to Melzer's reagent (see descriptions of individual species herein). A strand of cytoplasm stretches from the ring to the ascospore mass, and envelopes the spores. Each ascus contains eight or more than eight ascospores. The spores in eight-spored asci may be variously arranged, but are never biseriate. Asci remain attached to the subhymenium at maturity.

4. Ascospore morphology and color. Ascospores range in shape from allantoid to subinequilateral, and from

nearly straight to strongly curved. Munk (1953) believed diatrypaceous ascospores to be laterally flattened. We have seen no evidence for this in fresh collections although in older herbarium material the ascospores frequently are collapsed and flattened. Ascospores are never hyaline, but range from subhyaline to brown. They frequently appear nearly hyaline when viewed singly, but in masses they appear darker and their pigmented nature is more apparent. They lack germ slits or pores, or other obvious germination sites.

5. Conidiogenous cell proliferation. Conidiogenous cells proliferate percurrently or sympodially. Some species show only one kind of conidiogenous cell proliferation, whereas both kinds occur in other species. Sometimes, both kinds of proliferation occur in the same cell. Although phialides have been reported in the family (Croxall, 1950; Johnson and Kuntz, 1978), subsequent studies have not demonstrated phialides in the group (Glawe, 1984, 1983a, b; Glawe and Rogers, 1982a, b; Messner and Sutton, 1982; Rogers and Glawe, 1983; Sutton, 1980). Conidia are produced in an apparently holoblastic manner in the sense of Kananaskis I (Kendrick, 1971).

6. Conidium morphology. Conidia are single-celled, hyaline, flat-based, and range in shape from allantoid to filiform, and from nearly straight to strongly curved. They do not germinate readily.

As delimited by the above features the Diatrypaceae is a relatively homogeneous group, distinct from other Pyrenomycetes. This interpretation of the Diatrypaceae is similar to those of Nannfeldt (1932), Luttrell (1951), and Tiffany and Gilman (1965), but differs from that of Dennis (1978) and several other authors who include a heterogeneous group of fungi in the family.

GENERIC LEVEL: Features used to separate genera include the following:

1. Degree of stromatal development. Stromata may be well-developed, composed mostly of fungal tissue and containing light-colored pseudoparenchyma as in **Diatrype** and **Diatrypella**, or may be poorly developed and composed of a mixture of fungal and host tissue. Stromata of some species tend to be intermediate or variable, complicating classification.

2. Type of host tissue in which stromata occur. Stromata of a given genus usually occur either in bark or in decorticated wood. In some species, however, stromata occur in both kinds of tissues.

3. Configuration of perithecial necks. Perithecial

necks are separately erumpent in most genera, but tend to converge at the center of the stroma in **Eutypella.** In **Cryptovalsa** both convergent and singly erumpent perithecial necks occur. Species within a genus differ as to the degree to which perithecial necks converge.

4. Number of ascospores per ascus. Diatrypaceous asci contain either eight or more than eight ascospores. Most genera have eight-spored asci, while **Diatrypella** and **Cryptovalsa** are defined partly on the basis of multispored asci.

Separating genera according to the above features is a relatively convenient system which has been widely used in the past (**e.g.**, Saccardo, 1882). It is an artificial system since few characters are used, and therefore is unlikely to accurately reflect phylogenetic lines. Recent treatments have tended to recognize fewer genera (**e.g.**, Tiffany and Gilman, 1965) than recognized here, or to emphasize supposed phylogenetic lines (**e.g.**, Wehmeyer, 1926), but we prefer a more conservative generic concept. Lumping diatrypaceous fungi into fewer genera tends to mask the morphological diversity of the family, and results in dissimilar organisms being placed in the same genus. It seems better to employ more genera in order that each genus may be more homogeneous.

SPECIES LEVEL: Features used to separate species include the following:

1. Stromatal shape. Croxall (1950) believed that stromatal shape varies within a species according to host. In our experience, however, stromatal shape tends to be rather constant within a species.

2. Stromatal size. Size ranges of stromata tend to be similar among collections within species.

3. Color of stromatal surface. Coloration of the stromatal surface is similar within a given species, but often changes during stages of development. Thus, the white surface of young **Diatrypella favacea** stromata helps separate it from the brown immature stromata of **D. verrucaeformis**. Stromata of **Diatrypella discoidea** var. **alni** are tan while immature, become reddish-brown as they mature, and are black when overmature. Similar color changes occur in other species.

4. Features of stromatal surfaces. Stromata in many species are characteristically fissured, or have other distinctive structures. For example, **Diatrype stigma** stromata usually are fissured through their entire thickness. More typically, fissuring in diatrypaceous fungi involves only the outer part of the stromata.

Diatrypella discoidea var. **alni**, with fissures which extend radially from perithecial ostioles, can be distinguished from **D. rimosa**, which has fissures extending transversely across stromata. **Diatrype stigma** collection group 3 is distinguished partly on the basis of stromatal pegs.

5. Color of stromatal interior. Color of pseudoparenchymatous tissue inside stromata varies from brownish to white to olive- or yellow-green, but is usually some shade of white or yellowish-white. Color of this tissue tends to be similar within a species.

6. Ornamentation of perithecial ostioles. Perithecial ostioles of many diatrypaceous fungi are sulcate (furrowed). Species differ both as to the number of sulcations per ostiole, and the degree to which sulcations develop.

7. Configuration of perithecial necks. Perithecial necks may emerge separately, or converge toward the centers of stromata and emerge in groups. Thus, in **Diatrypella**, perithecial necks do not converge in **D. discoidea** var. **alni**, but do converge somewhat in **D. verrucaeformis**. Degree of convergence tends to be similar within a species.

8. Ascus size. Diatrypaceous ascus sizes are typically expressed as the length of the spore-bearing portion (abbreviated "**p. sp.**") by the width at the widest point. Ascus stipes are not included because of difficulties in measuring them. Size of the **p. sp.** tends to be similar within a species, and, especially in **Diatrypella**, size of the **p. sp.** tends to vary independently from ascospore size. Thus, **Diatrypella favacea** is differentiated from **D. verrucaeformis** partly on the basis of its smaller asci, even though ascospore sizes are similar.

9. Amyloid reaction of the apical ring. Diatrypaceous ascus rings are minute, circular structures, usually less conspicuous than the massive rings often found in Xylariaceae, and are associated with apical invaginations in asci. There is considerable variation among diatrypaceous fungi as to the reaction of apical rings in Melzer's reagent. Rings may be amyloid (turn blue in Melzer's reagent), may be amyloid in some asci but not others in a species, or may be inamyloid.

10. Ascospore size. Ascospore sizes tend to be similar within a species. While ascospore size is often important in delimiting species, many diatrypaceous fungi have ascospores of similar size, reducing the usefulness of this characteristic in separating species. In our opinion,

ascospore size has been overemphasized in some taxonomic treatments of the family.

11. Ascospore color. Color of ascospores ranges from subhyaline to brown, and is rather constant within a species. Coloration of a given ascospore is uniform in most taxa. An exception is **Cryptosphaeria pullmanensis**, which has ascospores which are darkened in both ends.

12. Ascospore shape. Ascospores vary in curvature among different species. Curvature tends to be similar among different collections of a species.

13. Conidium size. Conidium size may vary greatly within a species, or may be fairly constant. Three conidium sizes have been found in different collections referable to **Diatrype stigma**, suggesting that different taxa may have been included under this name. Conidium lengths have been found to be quite variable in different isolates of **Eutypa armeniacae** (Glawe **et al.**, 1982). Croxall (1950) reported both allantoid and filiform conidia in the same species of **Diatrypella**.

14. Conidium shape. Degree of conidium curvature often varies in different species (**e.g.** Glawe and Rogers, 1982a, b). Johnson and Kuntz (1978) found that conidium curvature is variable among different isolates of **Eutypella parasitica**.

15. Conidiogenous cell proliferation. Conidiogenous cells proliferate sympodially, percurrently, or by both modes. Sometimes, both kinds of proliferation occur in the same cell. Studies on conidial ontogeny in diatrypaceous fungi have utilized single isolates of different species, and thus the taxonomic value of this character has not been established at the species level.

16. Conidioma type. Various types of conidiomata occur in the Diatrypaceae, and range from pycnidial to sporodochium-like. Most are known only from culture. Conidiomata may vary little within a species, or may vary markedly, even within the same isolate or culture.

17. Host tissue in which teleomorph occurs. Teleomorphs may occur either in bark or in decorticated wood. In some species teleomorphs may occur in both tissues.

18. Host specificity. Species differ in the degree of host specificity they exhibit. Many **Diatrypella** species appear specific to one host genus. Some species, such as **Eutypa flavovirens** and **E. armeniacae**, have wide host ranges.

Combinations of the above features tend to be rather constant within a species. Some features are more variable in one species than another. No single characteristic can be relied upon in every instance to separate species. Not all of these features are known for every species; for example, the anamorphs of many species are unknown and consequently anamorphic data are not available to help circumscribe them.

Since the work of Croxall (1950) there has been a tendency to disregard host specificity and stromatal morphology, and to emphasize instead microscopic characteristics in separating species. This approach is based on the premise that microscopic characteristics are the least variable. In our experience we have found microscopic features to be no more or less constant or reliable than others. For this reason we believe it is best to weight different characters more equally when making taxonomic decisions, and to use as many characters as possible in separating species.

SUB-SPECIFIC TAXA: Two kinds of sub-specific taxa are used in this paper: the variety, and the collection group, a category without formal status according to the International Code of Botanical Nomenclature. **Diatrypella discoidea** var. **alni** is the only variety recognized herein, and it is recognized only to conform with the long-established practice of using that name. It appears that this and the other variety in the species probably would be better regarded as distinct species, but such a separation awaits study of additional collections. The "collection group" concept is used to embrace groups of similar fungi referable to **Diatrype stigma** in the traditional sense, but which differ from other collections of that "species." Collection groups differ from "taxonomic species" as used herein in that they refer to collections which fit the traditional concept of a species but which seem likely to be shown by additional research to represent different species, while "taxonomic species" refer to collections representing different species, but which cannot presently be named because of nomenclatural or other difficulties. At some future date it may be preferable to assign these collection groups to formal taxa. Several taxonomic and nomenclatural problems (see section on **Diatrype stigma**) need to be resolved before this can be done.

IV. DESCRIPTIVE SECTION

FAMILY DIATRYPACEAE

TELEOMORPHS: Perithecia variously embedded in host tissue, or in mixture of host and fungal tissue, or in well-developed stromata that may be pulvinate, hemispherical, or wide-spreading, eutypoid or valsoid. Perithecial necks usually sulcate, tending to be flattened and disc-shaped, or conical, or elongate. Paraphyses present, often difficult to observe in mature perithecia. **Asci** clavate to spindle-shaped, long-stipitate, remaining attached to hymenia at maturity, with refractive apical invaginations and inamyloid or amyloid apical rings, with eight or more ascospores per ascus. **Ascospores** allantoid to suballantoid or rarely cylindrical, nearly straight to strongly curved, single-celled, subhyaline to dark brown.

ANAMORPHS: Conidiomata pycnidial, sporodochium-like or acervulus-like structures, usually not found associated with teleomorphs in nature. **Conidiogenous cells** cylindrical, proliferating sympodially or percurrently or by both modes in the same species. **Conidia** single-celled, hyaline, usually cylindrical to filiform and nearly straight to strongly curved, infrequently allantoid, with flattened bases, not known to germinate.

Key to Genera

1a. Stromata well-developed, erumpent through bark. Region between perithecial necks occupied by pseudoparenchymatous entostromatic tissue . . . . 2a.
1b. Stromata poorly developed, typically embedded in bark or decorticated wood. Region between perithecial necks typically occupied by host tissue or mixture of host and fungal tissue, less frequently by pseudoparenchymatous entostromatic tissue . . . . 3a.

2a. Asci containing eight spores . . . . . **Diatrype**. (If with green entostroma, see **Eutypa flavovirens**).
2b. Asci with more than eight spores . . . . **Diatrypella**.

3a. Asci containing more than eight spores . . . . **Cryptovalsa**.
3b. Asci containing eight spores . . . . 4a.

4a. Perithecial necks erumpent in groups; stromata valsoid . . . . **Eutypella.**
4b. Perithecial necks singly erumpent; stromata not valsoid . . . . 5a.

5a. Perithecia embedded in bark . . . . . **Cryptosphaeria.**
5b. Perithecia usually embedded in decorticated wood, infrequently in bark . . . .**Eutypa.**

Cryptosphaeria Grev.

TELEOMORPHS: Stromata poorly developed, immersed in bark and evident only as a blackening of the host tissue, wide-spreading. **Perithecia** in one layer, embedded in bark. Ostioles poorly developed to subconical, asulcate or three- to five-sulcate. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, eight-spored. **Ascospores** subinequilateral to allantoid, slightly to moderately curved, subolivaceous to brown.

ANAMORPHS: Conidiomata acervulus-like or multichambered, pycnidial. **Conidiogenous** cells proliferating percurrently and/or sympodially. **Conidia** allantoid or filiform.

Pirozynski (1969) has raised nomenclatural objections to the use of the name **Cryptosphaeria.** While it appears that he is correct in his views on the problems associated with this name, we believe it best to continue using **Cryptosphaeria** temporarily, and expect that it will be replaced with a more suitable name when revisionary studies on the family are completed (see also Glawe, 1984).

Cryptosphaeria is represented in the Pacific Northwest by two species, both on **Populus.**

Key to **Cryptosphaeria** species

1a. Ascospores subolivaceous, 8-13 X 2-3 µm, cell walls in ends of ascospores not thickened or darkened . . . . **C. populina.**
1b. Ascospores brown, 11-13 X 4-5 µm, cell walls in ends of ascospores often thickened and darkened . . . . **C. pullmanensis.**

Cryptosphaeria populina (Pers. : Fr.) Sacc., **Syll. Fung.** 1:183. 1882.
Figs. 9, 10, 38.

TELEOMORPH: Stromata poorly developed, immersed in bark and evident only as a blackening of the host tissue (Figs. 9, 10), wide-spreading, often raising bark in rather extensive blister-like areas. **Perithecia** in one layer, embedded in bark, singly erumpent (Fig. 10), **ca.** 0.5 mm diam. Ostioles poorly developed to subconical, three- to five-sulcate. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, eight-spored, **p. sp.** (37-)45-60(-70) X (6-)7-11 µm. **Ascospores** allantoid (Fig. 38), slightly to moderately curved, subolivaceous, (7-)8-13(-14) X 2-3 µm.

ANAMORPH: Not seen. Described by Funk (1981).

COMMENTS: This fungus is apparently widespread on **Populus** throughout much of North America and is known in the Pacific Northwest from a number of collections on **Populus tremuloides** and **P. trichocarpa**. **Cryptosphaeria populina** often fruits on live or recently killed trees, and causes a canker disease on **Populus** (Hinds, 1981).

Cryptosphaeria pullmanensis D. A. Glawe, **Mycologia** 76:166. 1984.
Fig. 40.

TELEOMORPH: Stromata poorly developed, immersed in bark and evident only as a slight internal blackening of host tissue, wide-spreading. **Perithecia** in one layer, singly erumpent, ovoid, **ca.** 1 mm diam. Ostioles poorly developed to subconical, lacking distinct sulcations. **Asci** spindle-shaped, long-stipitate, with inamyloid apical rings, **p. sp.** 70-88 X 8.8-11 µm. **Ascospores** subinequilateral to allantoid, brown, cell walls thickened at each end, 11-13 X 4-5 µm.

ANAMORPH ON HOST: Conidiomata stromatic, multichambered, immersed in bark. **Conidiogenous cells** proliferating percurrently or sympodially. **Conidia** allantoid (Fig. 40), with flattened bases, hyaline, 6.4(-8.8) X (1.2-)1.6(-2.4) µm.

ANAMORPH IN CULTURE: Conidiomata either disc-shaped, **ca.** 0.3-0.75 mm diam, or globoid, 2-4 mm diam, multichambered. **Conidiogenous cells** proliferating percurrently or sympodially. **Conidia** allantoid, with flattened bases, hyaline, 7.2-8.8(-10.4) X 1.2-1.6(-2) µm. For further details see Glawe, 1984.

COMMENTS: This species is known only from the type locality in Pullman, Whitman Co., Washington, where it was found on **Populus trichocarpa.** It is easily separated from **C. populina** by its larger, darker ascospores and smaller conidia.

Cryptovalsa (Ces. & de Not.) Fuckel

TELEOMORPH: Stromata poorly developed, immersed in bark and evident only as a blackening of the host tissue, wide-spreading. **Perithecia** in one layer, embedded in bark, singly erumpent or in valsoid clumps. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations, multispored. **Ascospores** allantoid, subolivaceous.

ANAMORPH: Not seen.

COMMENTS: Cryptovalsa is known in the Pacific Northwest by a single species, described below.

Cryptovalsa taxonomic species

TELEOMORPH: Stromata poorly developed, immersed in bark and evident only as a blackening of the host tissue, wide-spreading. **Perithecia** in one layer, embedded in bark tissue, singly erumpent or in valsoid clumps, **ca.** 0.3 mm diam. Ostioles poorly developed, sulcations indiscernible. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, multispored, **p. sp.** 66-79 X 4-6 µm. **Ascospores** allantoid, slightly to moderately curved, subolivaceous, (8-)9-10(-11) X 2-2.5 µm.

ANAMORPH: Not seen.

COMMENTS: Known from a single collection from Monmouth, Polk Co., Oregon, on a host tentatively identified as **Acer circinatum.** In most features this fungus resembles Saccardo's (1882) description of **C. nitschkei** Fuckel. However, since no authentic material of **Cryptovalsa** was seen it was not possible to confidently identify this fungus.

Diatrype Fr.

TELEOMORPHS: Stromata usually erumpent through bark, rarely superficial on decorticated wood, discoid to pulvinate or hemispherical, discrete or wide-spreading, with upper surfaces slightly convex to flat. **Perithecia** in one layer, rarely in two, the region between perithecial necks occupied by white to brown pseudoparenchymatous entostromatic tissue. Ostioles distinctly or indistinctly three- to four-sulcate, rarely five-sulcate, flattened and circular to subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or faintly amyloid apical rings, eight-spored. **Ascospores** allantoid, subhyaline to pale olivaceous, rarely brown, slightly to moderately curved.

ANAMORPHS: Seldom or never found with teleomorph on host. **Conidiomata** in culture disc-shaped, sporodochium-like. **Conidiogenous cells** sympodially and/or percurrently proliferating. **Conidia** one-celled, hyaline, slightly to moderately curved.

COMMENTS: The well-developed stromata in **Diatrype** provide a number of characters which can be used to help separate species. Largely because of these stromatal characters, identification of species of **Diatrype** is easier and more certain than in most other diatrypaceous genera.

Key to **Diatrype** and **Diatrype**-like species

1a. On **Pseudotsuga** . . . . **D. diffindens.**
1b. On angiospermous hosts . . . . 2a.

2a. Stromata containing green pseudoparenchymatous tissue . . . . **Eutypa flavovirens.**
2b. Stromata containing white to brown pseudoparenchymatous tissue . . . . 3a.

3a. Stromata superficial on decorticated wood . . . . 4a.
3b. Stromata erumpent through bark . . . . .5a.

4a. Stromata oval, hemispherical, **ca.** 1-2 mm wide; ascospores pale olivaceous, usually 8-11 µm long . . . . . **Diatrype** taxonomic species 1.
4b. Stromata linearly confluent, **ca.** 1 mm wide; ascospores subolivaceous, usually 10-13 µm long . . . . **Diatrype** taxonomic species 2.
4c. Stromata discrete to wide-spreading, more or less pulvinate; ascospores brown, usually 11-14 µm long . . . . **D. whitmanensis.**

5a. Stromata wide-spreading . . . . 6a.
5b. Stromata discrete and small, circular to oval, disc-shaped or hemispherical . . . . 7a.

6a. Stromata wide-spreading apparently due to indeterminate growth . . . .

. . . . **Diatrype stigma sensu lato.**
6b. Stromata oval or irregular-shaped, often appearing wide-spreading due to coalescence of stromata . . . . **Diatrype** taxonomic species 3.

7a. Stromata hemispherical; ascospores usually 10-12 µm long . . . . **Diatrype microstega.** (see also **Eutypella oregonensis**).
7b. Stromata disc-shaped, sometimes coalescing; ascospores usually smaller . . . . 8a.

8a. Stromata usually 2-5 mm diam . . . . **D. bullata.**
8b. Stromata usually 1-3 mm diam . . . . **D. disciformis.**

Diatrype bullata (Hoffm. : Fr.) Fr., **Summ. Veg. Scand.** 2. p. 385. 1849.
Figs. 27, 28, 30.

Diatrype macounii Ell. & Everh., **Proc. Acad. Nat. Sci. Phil.** p. 224. 1890.

TELEOMORPH: Stromata erumpent through bark, pulvinate, circular to oval, upper surface nearly flat to slightly convex, (1-)2-5(-6) mm diam X 0.5 mm thick, often coalescing. Surface reddish-brown to black, rather smooth. **Perithecia** in one layer, **ca.** 0.2 mm diam. Entostromatic region between perithecial necks occupied by mixture of white and reddish-brown pseudoparenchymatous tissue, appearing off-white or tan macroscopically. Ostioles three- to four-sulcate, circular, flattened. **Asci** (Figs. 27, 28, 30) spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid or inamyloid apical rings, eight-spored, **p. sp.** (20-)25-40(-45) X (3-)4-6(-7) µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous, 5-7(-8) X 1-1.5 µm.

ANAMORPH IN CULTURE: Cultured on Bonar's modification of Leonian's agar (Booth, 1971). **Conidiomata** resembling rudimentary pycnidia. **Conidiogenous cells** proliferating holoblastically in sympodial sequence. **Conidia** nearly straight to J-shaped or C-shaped, frequently flattened or swollen near the middle with flattened bases, hyaline, 11-17(-20) X 1-2 µm. For further details see Rogers and Glawe, 1983.

COMMENTS. This species is widespread in the Pacific Northwest, occurring on **Acer, Alnus,** and **Salix.** The anamorph was not found in any of the collections examined.

Examination of two collections marked as type material of **Diatrype macounii** Ell. & Everh. indicated that the name is a synonym of **D. bullata**. These collections resembled **D. bullata** in every respect, except that they were the only collections seen from **Acer**. **Diatrype bullata** is similar to **D. disciformis** except that it usually has larger stromata than that species.

Diatrype disciformis (Hoffm. : Fr.) Fr., **Summ. Veg. Scand.** 2. p. 385. 1849.

TELEOMORPH: Stromata erumpent through bark, pulvinate, circular to oval or rather angular, upper surface nearly flat to slightly convex, 1-3(-4) mm diam X 0.5 mm thick. Surface reddish-brown to black, usually smooth, rarely fissured. **Perithecia** in one layer, **ca.** 0.3 mm diam. Entostromatic region between perithecial necks occupied by mixture of white and reddish-brown pseudoparenchymatous tissue, appearing off-white or tan macroscopically. Ostioles three- to four-sulcate, subconical, often indistinct. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** (23-)30-40 X 4-5 µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous, (4-)5-7(-8) X 1(-1.5) µm.

ANAMORPH: Not seen.

COMMENTS: This species is known in the Pacific Northwest from seven collections on **Lithocarpus densiflorus** from a single location in southern Oregon (Kauffman, 1929). These collections strongly resemble European material of this fungus from **Fagus**.

Diatrype microstega Ell. & Everh., **N. Am. Pyren.**, p. 574. 1892.

TELEOMORPH: Stromata erumpent through bark, pulvinate to hemispherical, circular, 0.5-1 mm diam. Surface dark brown to black, rather roughened or smooth. **Perithecia** in one or two layers, **ca.** 0.3 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles poorly developed or three- to four-sulcate, subconical. **Asci** agglutinated, characteristics not determinable; **p. sp.** described on annotation label by C. H. Kauffman as 32-40 X 5-6 µm. **Ascospores** allantoid, moderately curved, subolivaceous, (8-)9-13(-16) X (2-)2.5-3 µm.

ANAMORPH: Not seen.

COMMENTS: This species is known in the Pacific Northwest from three collections on **Umbellularia californica** from southern Oregon (Kauffman, 1929). These collections are nearly identical with the description for **D. microstega,** which was based on a collection from California. However, since the type collection was not seen this identification is tentative. Two of these collections were identified by the collector as **Eutypella minuta** Berl. & F. Sacc. Although they resemble the description given by Saccardo (1891) for this species, the well-developed stromata in these collections are typical of **Diatrype** rather than **Eutypella.** Further study of both **D. microstega** and **E. minuta** is needed; their descriptions suggest they may be conspecific.

The third collection was identified by the collector as **Diatrype prominens** Cooke & Harkn. Ellis and Everhart (1892) described that species as having ascospores 6-8 X 2 µm, a size range smaller than observed in these collections. Ellis and Everhart (1892) reported a collection from California on **Mimulus glutinosa,** also identified as **D. prominens,** as having ascospores 8-10 µm, which is similar in size to the Oregon collections. However, reports of **Diatrype** spp. on herbaceous hosts are so infrequent that we are skeptical about this report. There is no reason to believe that these collections can be accommodated in **D. prominens.**

Diatrype stigma (Hoffm. : Fr.) Fr., **Summ. Veg. Scand.** 2. p. 385. 1849.

In the broad, traditional sense, this name applies to diatrypaceous fungi having thin, wide-spreading stromata with eight-spored asci. Previous workers, however, have cited differences in ascospore and conidium sizes among different collections of **D. stigma** (Ellis and Everhart, 1892; Glawe and Rogers, 1982a; Nitschke, 1867; Saccardo, 1882; Wehmeyer, 1926), as well as stromatal differences among collections (Bisby **et al.,** 1938), suggesting that this name has been applied to more than one taxon. Examination of collections which fit **D. stigma** in the broad sense corroborate observations made by these earlier workers. Thus, in this treatment, **D. stigma** tentatively is divided into five groups of collections based on ascospore size, conidial size, and stromatal features; representatives of three of these groups have been found in the Pacific Northwest, while the other two groups are known from other areas. It remains for future studies to determine the taxonomic status of these groups. **Diatrype stigma** is an old name with many synonyms (see Tulasne and Tulasne, 1863, Ellis and Everhart, 1892), and without investigations of type material it is impossible to determine the correct application of the name.

Unfortunately, the anamorphs of these fungi are only rarely collected with their teleomorphs under natural conditions, making it necessary in most instances to culture them in order to determine their affinities. It was not possible in this study to culture every collection. Instead, representative collections were cultured, and seemingly similar fungi, as determined by teleomorph characteristics, hosts, and collection locations were grouped together. Obviously, further cultural studies are needed to better circumscribe these groups, as well as to determine if additional groups exist.

Key to collection groups within **Diatrype stigma**

1a. Ascospores usually 10-12 µm long . . . . Collection Group 1.
1b. Ascospores usually smaller . . . . 2a.

    2a. Stromata with pegs or with numerous crater-like depressions resulting from dehiscence of stromatal pegs . . . . . . Collection Group 3.*
    2b. Stromata without crater-like depressions or pegs . . . . 3a.

3a. Stromata of uneven thickness, **ca.** 1-2 mm thick, with undulating surfaces . . . . Collection Group 2.
3b. Stromata usually 1 mm or less thick, smooth . . . 4a.

    4a. Conidia usually nearly straight, 23-38 µm long; on **Fagus** . . . . Collection Group 4.*
    4b. Conidia usually slightly to moderately curved, usually 13-17 µm long; on **Betula**, **Acer**, or other hosts . . . . Collection Group 5.

*Not known from the Pacific Northwest.

Diatrype stigma, Collection Group 1

TELEOMORPH: Stromata erumpent through bark, wide-spreading, **ca.** 0.5 mm thick, upper surface flat. Surface reddish-brown to black, usually with deep transverse fissures. **Perithecia** in one layer, **ca.** 0.25 mm diam. Entostromatic region between perithecial necks occupied by white or brown pseudoparenchymatous tissue. Ostioles three- to four-sulcate, disc-shaped, flattened to slightly raised. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or slightly amyloid apical rings, eight-spored, **p. sp.** (45-)50-60 X 5-8 µm. **Ascospores** allantoid, slightly to moderately curved, subolivaceous, (9-)10-12(-14) X 2-3 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus appears widespread in eastern Washington and northern Idaho, and probably also occurs in other parts of the Pacific Northwest. It has been collected on **Crataegus**, **Acer**, and **Alnus**. It is distinguished from the other collection groups by the larger asci and ascospores.

Diatrype stigma, Collection Group 2

Diatrype stigmaoides Kauffman, **Pap. Mich. Acad. Sci.** 11:166. 1929.

TELEOMORPH: Stromata erumpent through bark, wide-spreading, unevenly 1-2 mm thick, resulting in undulating upper surface with rounded margins. Surface dark brown to black with deep transverse fissures. **Perithecia** in one layer, **ca.** 0.15-0.3 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles three- to four-sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** 24-31 X 4.4-6 µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline, 5-7(-8.5) X 1-1.5 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus is known from several collections on fallen **Quercus** branches in south central Washington and southern Oregon.

Kauffman (1929) separated this fungus from **D. stigma** on the basis of its small ascospores, which he gave as 4-4.5(-6) X 0.5-0.8 µm, and by its rather prominent ostioles. Examination of a portion of the type collection, however, revealed that the ascospores are larger, falling into the above size range. Although the ostioles of the type are rather prominent, they are not otherwise different from those of other **Diatrype** collections. A more significant feature of this fungus appears to be the variable thickness of the stromata, which imparts a distinctive undulating appearance. In addition, this fungus appears restricted to **Quercus**. Cultural studies and observations on additional collections of teleomorphs are needed to determine if this fungus should be considered as distinct from other groups within **D. stigma**.

Diatrype stigma, Collection Group 3

TELEOMORPH: **Stromata** erumpent through bark, wide-spreading, 0.5 mm or less thick, upper surface flat. Surface initially white, becoming reddish-brown to grayish-brown, with deep transverse fissures; producing black, peg-shaped stromatic structures on upper surfaces of stromata, up to 1 X 2 mm. These structures raise the host's bark from the stroma and tend to remain attached to the bark, usually dehiscing from the stroma, and leaving crater-shaped depressions in the stromatal surface. **Perithecia** in one layer, **ca.** 0.25 mm diam. Entostromatic region between perithecial necks occupied by yellowish-white pseudoparenchymatous tissue. Ostioles three- to four-sulcate, disc-shaped, somewhat convex to flattened. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** 33-45 X 4-6 µm. **Ascospores** allantoid, slightly to moderately curved, subolivaceous, (6.5-)7-9 X 1.5-2 µm.

ANAMORPH IN CULTURE: Colonies covering plates in 10 da, white, rather felty, with diffuse margin, reverse coloration creamy white. Month-old colonies white, dense, with cottony aerial hyphae, producing a few small (less than 0.5 mm diam) disc-shaped sporulating areas with pale yellow conidial masses; reverse coloration tannish-yellow, black beneath sporiferous areas. **Conidiogenous cells** cylindrical, sometimes attenuated at apices in manner suggestive of percurrent proliferation, producing conidia holoblastically. **Conidia** allantoid, with flattened bases, hyaline, 6.5-7(-7.5) X (1-)1.5(-2) µm.

COMMENTS: Two collections on **Quercus** in central Minnesota were seen. It is separated from other groups within **D. stigma** by the stromatal pegs and the small allantoid conidia. The production of stromatal pegs by **D. stigma** was reported by Bisby **et al.** (1938) who suggested that collections with this feature might represent a distinct species. Tulasne and Tulasne (1863) described a similar fungus as **Stictosphaeria hoffmanni** Tul. (later regarded as a synonym of **D. stigma**); this fungus was on

Quercus, had white stromata while immature, and allantoid conidia similar to those reported here. However, the Tulasnes did not describe the stromatal pegs which are so conspicuous in the Minnesota collections. Although the fungus with stromatal pegs probably should be regarded as a distinct taxon, unresolved nomenclatural problems concerning **D. stigma** and the possible relationship between this and the Tulasnes' fungus prevent a firm taxonomic decision at this time.

The anamorph was not observed in either collection, and was obtained only once in culture. Owing to the small amount of anamorphic material available, only preliminary studies of it were made; the mode of conidiogenesis could not be determined.

Diatrype stigma, Collection Group 4
Fig. 11.

TELEOMORPH: Stromata erumpent through bark, wide-spreading, 0.5 mm thick, upper surface flat. Surface brown to black with deep transverse fissures (Fig. 11). **Perithecia** in one layer, **ca.** 0.25 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles three- to four-sulcate, rarely five-sulcate, circular, flattened. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and faintly amyloid apical rings, **p. sp.** 32-45 X 5-6 µm. **Ascospores** allantoid, slightly to moderately curved, subolivaceous, (6-)7-8(-9) X 1.5-2 µm.

ANAMORPH IN CULTURE: Conidiomata disc-like. **Conidiogenous cells** producing conidia holoblastically, proliferating percurrently. **Conidia** nearly straight to slightly curved, with flattened bases, hyaline, (17-)23-28 X 1-1.5 µm. For further details see Glawe and Rogers, 1982a.

COMMENTS: Two collections on **Fagus** from England were seen. This fungus is distinguished from other Collection Groups by its long, nearly straight conidia. Similar conidial lengths in **D. stigma** have been cited by previous authors (**e.g.**, Wehmeyer, 1926; Saccardo, 1882).

Diatrype stigma, Collection Group 5
Figs. 8, 41.

TELEOMORPH: Stromata erumpent through bark, wide-spreading, 0.5 mm thick, upper surface flat. Surface reddish-brown to black, with deep transverse fissures.

Perithecia in one layer, **ca.** 0.2 mm diam. Entostromatic region between perithecial necks occupied by white to tan pseudoparenchymatous tissue. Ostioles (Fig. 8) three- to four-sulcate, disc-shaped, flattened. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or amyloid apical rings, eight-spored, **p. sp.** 24-42 X 4-6(-7) µm. **Ascospores** allantoid, slightly to moderately curved, rarely strongly curved, subolivaceous, 5-8 X 1-2 µm.

ANAMORPH IN CULTURE: Twenty-day-old colony buff-colored to white, felty, with floccose clumps of hyphae near center. Conidia produced within small (less than 0.5 mm diam) disc-shaped sporulating areas, producing orange-yellow conidial masses; reverse coloration tannish-yellow. **Conidiophores** much-branched, arising from pseudoparenchyma. **Conidiogenous cells** arranged in dense palisades, cylindrical, apically distorted in sympodial manner or with attenuated apices suggestive of percurrent proliferation, 10-23(-27) X 1-2 µm. Conidia produced holoblastically in sympodial sequence, or possibly from percurrently proliferating conidiogenous cells, tending to secede at maturity. **Conidia** slightly to moderately curved (Fig. 41), with flattened bases, hyaline, (10-)13-17(-18) X 1-2 µm.

COMMENTS: This collecton group is based primarily on material from **Betula**, although the fungus also appears to occur on other hosts. This fungus is common in the Pacific Northwest and is separated from other Collection Groups by its intermediate-sized conidia. Although the collections on **Betula** resemble each other and apparently are the same organism, collections from other hosts are referred to this group only tentatively, pending cultural studies and observations on additional collections.

Diatrype whitmanensis J. D. Rogers & D. A. Glawe, **Mycotaxon** 18:73. 1983.

TELEOMORPH: Stromata on decorticated wood, discrete to rather widespreading, more or less applanate to pulvinate, surface dull black. **Perithecia** in one layer, 0.5-0.7 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles papillate to nearly digitate, some with 3-4 ill-defined sulcations. **Asci** clavate to spindle-shaped, long-stipitate, with inamyloid apical rings, **p. sp.** 50-60 X 7 µm. Ascospores allantoid to inequilateral, brown, (9.5-)11-14(-17.6) X 3-4 µm.

ANAMORPH IN CULTURE: Cultured on Bonar's modification of Leonian's agar (Booth, 1971). **Conidiomata** resembling rudimentary pycnidia. **Conidiogenous cells** proliferating sympodially. **Conidia** nearly straight to J-shaped to C-shaped, with flattened bases, hyaline, (16-)20-42(-44) X 1-2 µm. For further details see Rogers and Glawe, 1983.

COMMENTS: Diatrype whitmanensis is known only from the type location in Whitman Co., Washington. It differs from other **Diatrype** spp. described herein in having brown ascospores. It superficially resembles a **Eutypa**, but is separable from that genus because of the well-developed pseudoparenchymatous tissue within the stromata.

Diatrype taxonomic species 1

TELEOMORPH: Stromata superficial on decorticated wood, oval, approaching hemispherical, 1-2 X 2-3 mm X 0.5 mm thick. Surface black, rather roughened, often incorporating elements of host tissue, wood adjacent to stromata often superficially blackened. **Perithecia** in one or sometimes two layers, **ca.** 0.25 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles three- to four-sulcate, subconical, slightly raised, poorly developed. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, eight-spored, **p.sp.** 45-50 X 7-10 µm. **Ascospores** allantoid, moderately curved, pale olivaceous, 8-11(-12) X 2-2.5 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus is known from a single collection near Moscow, Idaho. Although it resembles **D. whitmanensis**, it differs sufficiently to be regarded as distinct.

Diatrype taxonomic species 2

TELEOMORPH: Stromata superficial on decorticated wood, oval to linearly confluent, **ca.** 1 mm wide. Surface black, often incorporating elements of host tissue. **Perithecia** in one layer. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles three- to four-sulcate, subconical, rather prominent. **Asci** agglutinated, characteristics not determinable; **p. sp.** described on annotation label by C. H. Kauffman as 35-40 X 5-7 µm. **Ascospores** allantoid, moderately curved, subolivaceous, (9-)10-13(-16) X 2.5-3 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus is known from a single collection on **Umbellularia californica** from southern Oregon. It is placed in **Diatrype** because the well-developed stromata contain white entostromatic tissue. However, it resembles **Eutypa** in that it occurs on decorticated wood and has host tissue incorporated into the outer stromatal layer. It is distinguished from **Diatrype** taxonomic species 1 by larger ascospores and from **Diatrype microstega** by linearly confluent stromata, although it resembles **D. microstega** microscopically. The description for **Diatrype maclurae** Ell. & Everh. (Ellis and Everhart, 1892) is very similar to this fungus. Further studies based on additional collections will be necessary to clarify the taxonomy of this organism.

Diatrype taxonomic species 3

TELEOMORPH: Stromata erumpent through bark, pulvinate, angular, oval or irregular, nearly flat, **ca.** 3-7 mm across X 0.5-1 mm thick, often coalescing. Surface reddish-brown to black. **Perithecia** in one layer, **ca.** 0.25 mm diam. Entostromatic region between perithecial necks occupied by mixture of white and reddish-brown pseudoparenchymatous tissue, appearing off-white or tan macroscopically. Ostioles three- to four-sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or slightly amyloid apical rings, eight-spored, **p. sp.** 25-35 X (4.5-)5-6 µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline, (4-)5-6(-6.5) X 1-1.5 µm.

ANAMORPH IN CULTURE: Colonies white, covering plate in 9 da, closely appressed with slightly irregular margins, reverse coloration pale yellow, fading toward edge. Month-old colony yellow-tan with white margin, with numerous small (less than 1 mm diam) olivaceous floccose clumps of hyphae, with small (less than 0.5 mm diam) disc-shaped sporulating areas which often coalesce, producing pale yellow conidial masses. Reverse coloration deep yellow-brown. Conidiophores much-branched. **Conidiogenous cells** cylindrical, curved, or straight, often apically scarred in sympodial manner or apically attenuated in manner suggestive of percurrent proliferation, (13-)15-21(-30) X 1-2 µm. Mode of conidial ontogeny not determined. **Conidia** moderately curved, with flattened bases, hyaline, (16-)18-20(-23) X 1-2 µm.

COMMENTS: This fungus is known from two collections on **Alnus rubra** in the Pacific Northwest, and resembles

Diatrype bullata in ascus and ascospore size. It appears to differ from that fungus in having stromata that are often irregular in shape or coalescent. Further studies are necessary to determine whether this fungus should be regarded as a distinct species.

In culture, conidiogenous cells with features suggestive of both percurrent and sympodial proliferation were observed. However, additional studies are needed to determine the mode or modes of conidiogenesis in this fungus.

Uncertain **Diatrype** species

Diatrype diffindens Kauffman, **Pap. Mich. Acad. Sci.** 11:165. 1929.

Kauffman's (1929) description follows: "Stromata at first immersed in the wood, pushing through the surface as lentil-shaped or fusiform humps, 1-2 mm X 0.5-0.75 mm, then splitting the wood fibers longitudinally, only the surface becoming exposed at maturity, with a faint dark zone separating them from the wood. Perithecia 0.25-0.33 mm in diam., oval, 2 to 6 or rarely more in a stroma, loosely arranged, the ostioles quadrisulcate or stellate and enlarged, the necks short and emerging separately. Asci clavate on long slender pedicels, 8-spored, 60-70 X 6-8 µm (sp. pt. 32-38 µm). Ascospores allantoid, subhyaline, tinged brownish, obtuse, somewhat curved, 9-11(-12) X 2.5(-3) µm."

COMMENTS: The only fungus in the portion of type collection that was examined was a group of badly decayed stromata which did not appear diatrypaceous. Possibly, other material from the type collection will be found to include the fungus that Kauffman described. Kauffman's (1929) description appears to be the only report of a diatrypaceous fungus on a gymnosperm in the Pacific Northwest.

Diatrypella (Ces. & de Not.) Sacc.

TELEOMORPHS: **Stromata** erumpent through bark, pulvinate, circular to elliptical or elongate, with upper surfaces variously flat, convex, or subhemispherical, with sloping or vertical margins, 1-5 mm across, sometimes coalescing. **Perithecia** in one or sometimes several layers, the entostromatic region between perithecial necks occupied by white, tan, or green pseudoparenchymatous tissue. Ostioles distinctly or indistinctly three- to six-sulcate, subconical or flattened and circular. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or faintly amyloid apical rings, multispored. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous.

ANAMORPHS: seldom or not found with teleomorphs on hosts. **Conidiomata** in culture disc-shaped, sporodochium-like. **Conidiogenous cells** proliferating sympodially and/or percurrently. **Conidia** nearly straight to strongly curved, hyaline, one-celled.

COMMENTS: Taxonomically, **Diatrypella** is probably the best known genus in the Diatrypaceae, largely because the well-developed stromata provide taxonomic characters not found in genera with poorly developed stromata. In addition, **Diatrypella** species often appear to be restricted to a single host genus. Two keys to **Diatrypella** species are presented, one based primarily on hosts, the other primarily on morphology.

Key to **Diatrypella** species based primarily on hosts

1a. On **Quercus** . . . . **D. pulvinata.**
1b. On **Corylus** or **Umbellularia** . . . . **D. decipiens.**
1c. On **Alnus** . . . . 2a.
1d. On **Betula** . . . . 4a.

2a. Stromata subconical, all but highest portion covered by bark . . . . **D. verrucaeformis.**
2b. Stromata flat to slightly convex, entire surface exposed . . . . 3a.

3a. Stromata with fissures radiating from ostioles in stellate manner; interior off-white or tan . . . . **D. discoidea** var. **alni.**
3b. Stromata with transverse fissures; interior white . . . . **D. rimosa.**

4a. Stromatal interior with green pseudoparenchymatous tissue . . . . **D. betulina.**
4b. Stromatal interior with white pseudoparenchymatous tissue . . . . **D. favacea.**

Key to **Diatrypella** species based primarily on morphology

1a. Stromata with sloping margins; bark closely adhering to stromata and partially covering them . . . . . 2a.
1b. Stromata with more nearly vertical margins, usually rupturing bark so that sides of stromata are exposed . . . . 4a.

2a. Spore-bearing portion of asci usually 100-132 X 11-15.5 µm; stromata subconical . . . . **D. verrucaeformis.**
2b. Spore-bearing portion of ascus smaller; stromata not subconical . . . . 3a.

3a. Stromatal surface white while immature, pruinose, with steeply sloping margins and nearly flat upper surfaces . . . . **D. favacea.**
3b. Stromatal surface not white while immature, roughened, more or less hemispherical . . . . **D. pulvinata.**

4a. Stromatal interior with green pseudoparenchymatous tissue . . . . **D. betulina.**
4b. Stromatal interior white or appearing tan macroscopically because of mixture of white and reddish-brown elements . . . . 5a.

5a. Stromatal surface with fissures radiating from ostioles in stellate manner . . . . **D. discoidea** var. **alni.**
5b. Stromatal surface smooth, or with fissures extending transversely across stromata but not radiating from ostioles in stellate manner . . . . 6a.

6a. Stromata oval to elongate, 1.5-2 X 2-3 mm . . . across . . . . **D. rimosa.**
6b. Stromata circular to oval, 2.5-3 X 4-5 mm . . . across . . . . **D. decipiens.**

Diatrypella betulina (Peck) Sacc., **Syll. Fung.** 1:208. 1882. Fig. 36.

TELEOMORPH: Stromata erumpent through bark, pulvinate, transversely oval to elliptical, upper surfaces nearly flat, (1-)1.5-3 X 2-4(-5) mm across X 1 mm thick. Surface dark brown to black. **Perithecia** in one layer, **ca.** 0.4 mm diam. Entostromatic region between perithecial necks occupied by olive-green to pale yellow-green pseudoparenchymatous tissue. Ostioles well-developed, three- to four-, rarely six-sulcate, disc-shaped, flattened. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or faintly amyloid apical rings, multispored, **p.sp.** (40-)44-60(-77) X (6-)7-9(-10) µm. **Ascospores** (Fig. 36) allantoid, slighty to moderately curved, subhyaline, 4-6(-8) X 1(-1.5) µm.

ANAMORPH ON HOST: Conidiomata not observed. **Conidia** strongly curved, hyaline, (15-)18-25 X 1-2 µm. Conidia were found in two collections.

COMMENTS: This species appears restricted to **Betula**, and probably is widespread in the Pacific Northwest. It fruits soon after the host dies and occasionally produces new crops of stromata for two or more seasons on the same branch. It is easily identified by the green stromatal interior.

Conidia thought to be of this fungus were found in two collections, but no conidiomata were found. Croxall (1950) reported that British species of **Diatrypella** formed **Libertella** states, which have reduced conidiomata. Conidiomata of **D. betulina** might also resemble those of **Libertella**.

Diatrypella decipiens Ell. & Everh., **J. Mycol.** 4:80. 1888.

TELEOMORPH: Stromata erumpent through bark, pulvinate, oval to circular, slightly convex, 2.5-3 X 4-5 um across. Surface dark brown to black, smooth or transversely fissured. **Perithecia** in one layer. Entostromatic region between perithecial necks occupied by white, or a mixture of white and reddish-brown, pseudoparenchymatous tissue. Ostioles poorly developed or three- to four-sulcate, circular. **Asci** agglutinated, characteristics not determinable; **p. sp.** described (Ellis and Everhart, 1888) as 50-70 X 6-7 µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline, 4-5 X 1 µm.

ANAMORPH: Not seen.

COMMENTS: Only two collections of this fungus were seen--the type collection on **Umbellularia californica**, and a later collection from **Corylus** sp. These collections differ in a number of respects. The **Umbellularia** collection has a smooth ectostroma, an entostroma that is a mixture of white and reddish-brown pseudoparenchymatous elements, sulcate ostioles, and moderately curved ascospores. The **Corylus** collection has a transversely fissured ectostroma, a lighter-colored entostroma, poorly developed ostioles, and slightly curved ascospores. These morphological differences, as well as the different hosts, suggest that these are different fungi. Ellis and Everhart (1888) stated that this species resembles **Diatrype bullata** in its external features, but has multispored asci. Since both collections fit this concept of the species, it appears premature to separate them until additional collections can be studied, and the significance of the above differences established.

The larger stromata separate this fungus from the otherwise similar **D. rimosa** and **D. discoidea** var. **alni.**

Diatrypella discoidea Cooke & Peck var. **alni** Cooke, cited in **N. Am. Pyren.**, p. 587. 1892.
Figs. 15-19, 35.

TELEOMORPH: Stromata (Figs. 15-19) erumpent through bark, pulvinate, circular to oval, upper surface nearly flat to slightly convex, (1-)1.5-3(-4) mm X 0.75 mm thick, often coalescing. Surface initially tan, later reddish-brown with black stellate fissures radiating from the black perithecial ostioles, finally becoming black and smooth. **Perithecia** in one layer, **ca.** 0.5 mm diam. Entostromatic region between perithecial necks occupied by mixture of white and reddish-brown pseudoparenchymatous tissue that appears tan macroscopically. Ostioles distinctly three- to four-sulcate, circular, flattened. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, multispored, **p. sp.** (35-)44-55(-62) X 4.4-6.6(-8) µm. **Ascospores** (Fig. 35) allantoid, slightly curved, subhyaline, (3-)4-5(-6) X 1(-1.5) µm.

ANAMORPH: Not seen.

CULTURES: Colonies covering plates in 11 da, white, rather thin, cottony, margins finely diffuse, reverse coloration pale yellow. Month-old colony with dense, cottony mycelium, white; reverse coloration tannish-yellow. Colony with odor reminiscent of walnuts. Conidia not observed in plates up to 3 months old.

COMMENTS: This fungus appears restricted to **Alnus** and is ubiquitous in the Pacific Northwest. It is often found on recently fallen or still-attached dead branches.

Diatrypella discoidea was described (Peck, 1879) from a collection on **Betula populifolia.** In the type description, two forms were mentioned, one with narrow transversely erumpent stromata, and another with suborbicular stromata. Since only one host was mentioned, presumably both forms occurred on **B. populifolia.** Ellis and Everhart (1892) later repeated the view that **D. discoidea** has two forms, but referred to the one with orbicular stromata as **D. discoidea** var. **alni** Cooke, occurring on alder, and implied that this form was specific to **Alnus** while the other form was specific to **Betula.** Subsequent workers have also tended to refer to this fungus on **Alnus** as **D. discoidea** var. **alni.** Unfortunately, we have been unable to find Cooke's description of this variety. Cooke's name for this fungus is used herein because the fungus discussed here resembles the description given by Ellis and Everhart (1892) for **D. discoidea** var. **alni,** and because this is the name traditionally applied to this fungus by North American mycologists. However, the apparent differences in morphology and hosts suggest that the two varieties might better be regarded as distinct species. Further work is needed to clarify this situation.

It appears that this may be the fungus that Rehm (1882) named **Diatrypella placenta** Rehm. That species was described on **Alnus viridis** in Europe. Rehm's description indicates that the fungus he dealt with was very similar to **D. discoidea** var. **alni.** In addition, a collection from Austria (WSP 31398), determined by F. Petrak to be **D. placenta,** appears identical with Pacific Northwest collections of **D. discoidea** var. **alni.** Study of the type collection of **D. placenta** will be necessary to determine whether it is conspecific with this North American fungus.

Diatrypella favacea (Fr.) Ces. & de Not., cited in **Syll. Fung.** 1:201. 1882.
Figs. 5, 32, 37, 42.

TELEOMORPH: Stromata erumpent through bark, pulvinate, transversely oval to elliptical, upper surface nearly flat to slightly convex, with sloping margins covered by closely adhering bark, 1.5-2 X 2-5 mm diam X 1 mm high. Surface initially white to buff-colored, becoming dark brown to black with age. **Perithecia** in one or sometimes two layers, **ca.** 0.5 mm diam. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles indistinctly four- to six-sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations (Fig. 32) and inamyloid or faintly amyloid apical rings, multispored, **p. sp.** 66-88(-110) X (9-)11-15.5 µm. **Ascospores** allantoid (Fig. 37), moderately to strongly curved, subhyaline, (4.5-)6-7(-9) X 1-2 µm.

ANAMORPH IN CULTURE: Conidiomata sporodochium-like. **Conidiogenous cells** proliferating sympodially (Fig. 5). **Conidia** moderately curved (Fig. 42), with flattened bases, hyaline, (22-)25-30(-31) X 1.5-2 µm. For further details see Glawe and Rogers, 1982a.

COMMENTS: This species appears to be restricted to **Betula** spp., and is widespread in the Pacific Northwest. It is often found on recently fallen or still-attached dead branches and tends to fruit soon after the host dies. Glawe and Rogers (1982a) discussed some problems in the taxonomy of this species.

Diatrypella pulvinata Nits., **Pyren. Germ.** p. 72. 1867. Figs. 3, 4, 6, 7.

TELEOMORPH: Stromata erumpent through bark, pulvinate, circular to oval, subhemispherical, with sloping margins covered by closely adhering bark, 1-4 X 1-6 mm X 1 mm thick. Surface black, roughened. **Perithecia** in one or two layers, **ca.** 0.3-0.5 mm diam. Entostromatic region between perithecial necks occupied by yellowish-white pseudoparenchymatous tissue. Ostioles three- to four-, occasionally five-sulcate, rather subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or faintly amyloid apical rings, multispored, **p. sp.** (44-)55-77(-88) X 6.6-9(-11) µm. **Ascospores** allantoid, moderately curved, subolivaceous, (5-)6-8(-9) X 1-1.5(-2) µm.

ANAMORPH IN CULTURE: Conidiomata disc-shaped. **Conidiogenous cells** proliferating sympodially and/or percurrently (Figs. 3, 4, 6, 7). **Conidia** strongly curved, with flattened bases, hyaline, 9-22 X 1-2 µm. See Glawe and Rogers (1982a) for further details.

COMMENTS: This fungus is known in the Pacific Northwest only from collections on dead branches of **Quercus** from central and eastern Washington. Although it appears likely that the fungus is restricted to **Quercus**, **D. pulvinata** will almost certainly be found to have a wider geographical distribution than reported here.

Diatrypella rimosa Shear, **Bull. Torr. Bot. Club** 29:454. 1902.

TELEOMORPH: Stromata erumpent through bark, pulvinate, oval to elongate, upper surface nearly flat, 1.5-2 X 2-3 mm X **ca.** 1 mm high. Surface dark brown to black, transversely fissured. **Perithecia** in one layer, **ca.** 0.5 mm diam. Entostromatic region between perithecial necks occupied by creamy white pseudoparenchymatous tissue. Ostioles indistinctly three- to four-sulcate, rather flattened. **Asci** agglutinated, characteristics not determinable; described by Shear (1902) as elongate-clavate, long stipitate, **p. sp.** 60-70 X 6-7 µm. **Ascospores** allantoid, slightly curved, subhyaline, 5-7 µm long.

ANAMORPH: Not seen.

COMMENTS: This species apparently is known only from the type collection on **Alnus** sp. from Wallowa Lake, Oregon. It differs from **D. discoidea** var. **alni** in that entostromata are creamy white instead of a mixture of white and reddish-brown elements, and the stromatal surface is fissured transversely instead of stellately from the ostioles. **Diatrypella rimosa** possibly is conspecific with **D. discoidea** var. **alni**. However, the small amount of **D. rimosa** available for study did not allow resolution of this question.

Diatrypella verrucaeformis (Ehrh. : Fr.) Nits., **Pyren. Germ.** p. 76. 1867.
Figs. 12-14, 29, 31.

TELEOMORPH: **Stromata** (Figs. 12-14) erumpent through bark, pulvinate, circular, subconical, with sloping margins covered by closely adhering bark, (1-)1.5-3 mm diam X 1 mm thick, often coalescing. Exposed portion dark brown to black. **Perithecia** in one or two, rarely three layers, **ca.** 0.5 mm diam. Entostromatic region between rather convergent perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles usually obscure, indistinctly three- to five-sulcate. **Asci** (Figs. 29, 31) spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, multispored, **p. sp.** (88-)100-132(-143) X (10-)11-15.5(-17.5) µm. **Ascospores** allantoid, moderately or variously curved, subolivaceous, (5-)6-8(-9) X 1-2 µm.

ANAMORPH IN CULTURE: **Conidiomata** sporodochium-like. **Conidiogenous cells** proliferating sympodially or percurrently. **Conidia** nearly straight to slightly curved, with flattened bases, hyaline, 23-34 X (1-)1.5-2 µm. For further details see Glawe and Rogers, 1982a.

COMMENTS: This fungus is common on **Alnus** in the Pacific Northwest, and apparently is restricted to this genus. It fruits soon after the host dies.

Glawe and Rogers (1982a) have discussed taxonomic problems regarding this species and the somewhat similar **D. favacea**. The teleomorph of the fungus assigned here to **D. verrucaeformis** is very similar to descriptions of this fungus given by several authors (Nitschke, 1867; Saccardo, 1882; Munk, 1957). However, their descriptions of stromata of this species do not adequately characterize it. A collection of **D. verrucaeformis** on **Corylus** from Czechoslovakia (WSP 55098), determined by F. Petrak, was found to have stromata that are more strongly developed than those of Pacific Northwest collections. Stromata of the Czechoslovakian collection are plateau-shaped and not covered by bark at maturity, whereas Pacific Northwest collections have subconical stromata covered by closely adhering bark. Thus, not having seen the type collection of **D. verrucaeformis**, assignment of the Northwest fungus to this species is tentative. As Munk (1957) pointed out, different fungi appear frequently to have been included under **D. verrucaeformis** ever since the taxon was erected. Further studies are needed to characterize more adequately the features of this taxon.

Eutypa Tul.

TELEOMORPHS: Stromata usually wide-spreading, embedded in decorticated wood or sometimes bark, usually poorly developed with ill-defined margins, sometimes discrete, **Diatrype**-like. Surface black, usually incorporating host elements, often roughened. **Perithecia** usually in one layer. Entostromatic region between perithecia composed variously of nearly unaltered host tissue, of blackened host tissue, or of green or white pseudoparenchymatous tissue. Ostioles three- to five-sulcate or asulcate, usually subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid rings, eight-spored. **Ascospores** suballantoid to allantoid, nearly straight to moderately curved, subhyaline to dark brown.

ANAMORPHS ON HOSTS: Conidiomata pycnidial, embedded among perithecia. **Conidiogenous cells** cylindrical, mode of conidiogenesis unknown. **Conidia** nearly straight to moderately curved, with flattened bases, hyaline.

ANAMORPHS IN CULTURE: Conidiomata pycnidial, sporodochium-like, or absent with conidiophores produced free on mycelium. **Conidiogenous cells** cylindrical, proliferating sympodially and/or percurrently. **Conidia** nearly straight to moderately curved, with flattened bases, hyaline.

COMMENTS: Eutypa is a taxonomically difficult genus. Most **Eutypa** species have few readily apparent taxonomic characters. An exception is **Eutypa flavovirens**, which is easily distinguished on the basis of its green entostroma. Owing to the reduced stromata and wide host ranges of many **Eutypa** species (**e.g.**, Saccardo, 1882), one must often rely on ascus and ascospore characters for identification. Thus, in this study **Eutypa** taxonomic species 1 is distinguished on the basis of the dark brown ascospores. In other cases, however, ascus and ascospore characteristics do not differ sufficiently to allow easy separation of species. Descriptions of **Eutypa acharii** Tul., **E. lata** (Pers. : Fr.) Tul., **E. ludibunda** Sacc., **E. milliaria** (Fr. : Fr.) Sacc., (Saccardo, 1882) and **E. armeniacae** (Carter, 1957) are similar. A number of collections resembling descriptions of those species were examined during this study. **Eutypa** taxonomic species 2 is distinguished by its hyphomycetous anamorph in culture. **Eutypa armeniacae** is distinguished partly by its pathogenicity on apricot. The remaining collections are assigned to **Eutypa** taxonomic species 3.

Key to **Eutypa** species

1a. Stromatal interior green; stromata sometimes discrete and **Diatrype**-like . . . . **E. flavovirens.**
1b. Stromatal interior white, or of blackened or unaltered host tissue; stromata usually poorly developed with ill-defined margins . . . . 2a.

2a. Ascospores dark brown . . . . **Eutypa** taxonomic species 1.
2b. Ascospores subhyaline to subolivaceous . . . 3a.

3a. Producing hyphomycetous anamorph in culture, colony cottony . . . .**Eutypa** taxonomic species 2.
3b. Not producing hyphomycetous anamorph in culture, or if so, colony not cottony but appressed . . . . . 4a.

4a. Pathogenic on apricot . . . . **E. armeniacae.**
4b. Not pathogenic on apricot . . . . **Eutypa** taxonomic species 3.

Eutypa armeniacae Hansf. & Carter, **Austral. J. Bot.** 5:21. 1957.

TELEOMORPH: Stromata wide-spreading, embedded in decorticated wood, rather poorly developed. Surface black, incorporating host elements. **Perithecia** in one layer, **ca.** 0.5 mm diam. Region between perithecia composed primarily of host tissue. Ostioles indistinctly sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** (30-)40-45 X 5-6 µm. **Ascospores** allantoid, slightly curved, subhyaline, (8-)9-10(-11) X 2 µm.

ANAMORPH IN CULTURE: Conidiomata pycnidial. **Conidiogenous cells** proliferating percurrently or sympodially. **Conidia** moderately curved, with flattened bases, hyaline, (34-)36-74(-78) X 1-1.5(-2) µm. For further details see Glawe and Rogers, 1982b; Glawe **et al.**, 1982; and Glawe **et al.**, 1983.

COMMENTS: This fungus is known in the Pacific Northwest from isolates obtained from apple trees (**Malus domestica**) (Glawe **et al.**, 1983) and diseased grapevines (**Vitis labrusca** and **V. vinifera**) (Glawe, 1978; Glawe **et al.**, 1982). The teleomorph has not been collected in the Pacific Northwest, but likely occurs there (Glawe **et al.**, 1982). The above description is based on a collection of the fungus on **Vitis vinifera** from California. Problems in the taxonomy of **E. armeniacae** are considerable, and have been discussed elsewhere (Glawe **et al.**, 1982).

Eutypa flavovirens (Pers. : Fr.) Tul., **Sel. Fung. Carp.** 2:53. 1863.
Figs. 23-26.

Diatrype hullensis Ell. & Everh. **N. Am. Pyren.** p. 567. 1892.

Eutypella virescens Wehm., **Mycologia** 28:41. 1936.

TELEOMORPH: Stromata (Figs. 23-26) wide-spreading, usually embedded in decorticated wood, sometimes in bark, often poorly developed, sometimes raising outer layers of host tissue to form blister-like areas but frequently producing comparatively well-developed discrete, **Diatrype**-like stromata. Surface black, usually incorporating host elements, roughened. **Perithecia** in one layer, sometimes in two layers, **ca.** 0.25 mm diam. Region between perithecial necks occupied by yellow-green to olive-green pseudoparenchymatous tissue. Ostioles variously developed, three- to four-sulcate, rarely five-sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and amyloid or inamyloid apical rings, eight-spored, **p. sp.** 29-50(-57) X (4.4-)5-9(-10) µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous, (5-)6-9(-11) X (1-)1.5-2(-3) µm.

ANAMORPH ON HOST: Conidiomata pycnidial, embedded among perithecia. **Conidiogenous cells** cylindrical, mode of conidiogenesis unknown. **Conidia** moderately curved, with flattened bases, hyaline, (17-)20-30 X 1-2 µm.

ANAMORPH IN CULTURE: Conidiomata sporodochium-like. **Conidiogenous cells** cylindrical, proliferating sympodially or percurrently. **Conidia** moderately to strongly curved, with flattened bases, hyaline, 19-28(-30) X 1-2 µm. For further details see Glawe and Rogers, 1982b.

COMMENTS: This species is common on rotting wood throughout the Pacific Northwest and appears to have a wide host range. In many cases the host is too decayed to be identified. Stromata of this fungus are long-persistent, and mature perithecia, immature perithecia, overmature perithecia, as well as the pycnidial state often occur in the same stroma. **Eutypa flavovirens** is most readily distinguished from other species by the green interior of the stromata.

Stromata of this fungus are unusually variable. In some collections stromata are only weakly developed, occurring in decorticated wood or in bark but not altering the external appearance of the host. In other cases stromata lift the outer layers of host tissue in blister-like swellings. This fungus also produces discrete stromata resembling those of **Diatrype**. Occasionally, **Diatrype**-like stromata and reduced stromata occur in the same collection. Both types of stromata were illustrated by Tulasne and Tulasne (1863).

Examination of type material of **Diatrype hullensis** and **Eutypella virescens** indicated that those fungi are indistinguishable from collections of **E. flavovirens** with **Diatrype**-like stromata, and therefore those names are regarded herein as synonyms of **E. flavovirens**.

In a test at Davis, California (W. J. Moller in Glawe, 1982), **E. flavovirens** was not pathogenic on apricot (**Prunus armeniaca**), but was reisolated successfully from inoculated plants six months after inoculation.

Eutypa taxonomic species 1
Figs. 21, 22, 39.

TELEOMORPH: Stromata (Fig. 21) wide-spreading, embedded in decorticated wood, rather weakly developed, often slightly raising outer layers of wood to form blister-like areas. Surface black, incorporating host elements. **Perithecia** (Fig. 22) in one layer, **ca.** 0.25-0.5 mm diam. Region between perithecia composed primarily of host tissue. Ostioles three- to four-sulcate, subconical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** (44-)50-65(-70) X 7-10 µm. **Ascospores** (Fig. 39) suballantoid to allantoid, nearly straight, dark brown, (7-)8-11(-12) X 3-3.5(-4) µm.

ANAMORPH: Not seen.

COMMENTS: This fungus is known from one collection from northeastern Washington and one from northern Idaho. Both collections were made from dead, unidentified host material. This species is distinguished by its dark brown, rather large ascospores.

Eutypa taxonomic species 2

TELEOMORPH: **Stromata** wide-spreading, embedded in decorticated wood, weakly developed. Surface black, rather scabrose. **Perithecia** in one layer, **ca.** 0.25 mm diam. Area between perithecia composed of blackened host tissue. Ostioles poorly developed. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and amyloid apical rings, eight-spored, **p. sp.** 35-40(-50) X 6-8 µm. **Ascospores** allantoid, moderately curved, subolivaceous, (7-)8-9(-10) X 2 µm.

ANAMORPH IN CULTURE: **Conidiomata** none, producing conidiogenous cells which radiate from anastomosed hyphae. **Conidiogenous cells** cylindrical, proliferating sympodially. **Conidia** slightly to moderately curved, with flattened bases, hyaline, 22-32 X 1-2 µm. For further details see Glawe and Rogers, 1982b.

COMMENTS: The teleomorph resembles descriptions of **E. acharii** Tul., **E. armeniacae**, **E. lata** (Pers. : Fr.) Tul., **E. ludibunda** Sacc., and **E. milliaria** (Fr. : Fr.) Sacc. (Saccardo, 1882) in various respects, as well as **Eutypa** taxonomic species 3 (see below). The unusual tendency to form a hyphomycetous anamorph in culture distinguishes it from other **Eutypa** species in the Pacific Northwest. This fungus was determined to be non-pathogenic on apricot (**Prunus armeniaca**) (W. J. Moller, in Glawe, 1982). It is known from a single collection from south-central Washington.

Eutypa taxonomic species 3

TELEOMORPH: Stromata widespreading, embedded in decorticated wood, usually poorly developed with ill-defined limits, sometimes strongly developed and somewhat resembling **Diatrype stigma**. Surface black, usually incorporating host elements. **Perithecia** in one layer, **ca.** 0.2-0.3 mm diam. Region between perithecia composed of blackened host tissue, or more rarely, of white pseudoparenchymatous tissue. Ostioles three- to five-sulcate, subconical, often poorly developed. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and amyloid or inamyloid apical rings, eight-spored, **p. sp.** 29-41(-53) X (4-)5-8.8(-11) µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous, 5-9(-12) X (1-)1.5-2(-3) µm.

ANAMORPH ON HOST: Conidiomata pycnidial, embedded among perithecia. **Conidiogenous cells** cylindrical. **Conidia** nearly straight to strongly curved, with flattened bases, hyaline, (10-)15-30 X 1-2 µm.

ANAMORPH IN CULTURE: Conidiomata variable, pycnidial, disc-like, or absent. **Conidiogenous cells** cylindrical, mode of proliferation unknown. **Conidia** hyaline, straight to strongly curved, with flattened bases, (7-)12-36 X 1-2 µm. For more details, see Glawe, 1982.

COMMENTS: The collections assigned to this taxonomic species have teleomorphs that resemble a variety of similar **Eutypa** species (see those discussed under **Eutypa** taxonomic species 2). Further study is needed to determine if these collections should be placed in an extant taxon. Preliminary cultural studies indicated that the anamorphs of this taxonomic species are quite variable, suggesting that it might include more than one species. The collections studied are from throughout the Pacific Northwest.

Eutypella (Nits.) Sacc.

TELEOMORPHS: Stromata erumpent through bark, valsoid, bounded within bark by zone line, circular to elliptical, with ostiolar disc 1-7 mm diam, surface black. **Perithecia** polystichous or monostichous, embedded in mixture of fungal and host tissue. Perithecial necks three- to five-sulcate, conical to rather elongate. **Asci** clavate to spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid or slightly amyloid apical rings, usually with bowl-shaped apical structures, eight-spored. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous.

ANAMORPHS: Poorly known. See descriptions of **E. cerviculata** and **E. sorbi**.

COMMENTS: **Eutypella** is represented in the Pacific Northwest by four species which apparently differ in host and, to some extent, in stromatal morphology.

Key to **Eutypella** species

(**E. oregonensis** is found in the key to **Diatrype** species.)

1a. Ostiolar disc 1-3 mm across . . . . . **E. cerviculata.**
1b. Ostiolar disc 1.5-7 mm across . . . . 2a.

2a. On **Sorbus**; ostiolar disc circular to subcircular . . . . **E. sorbi.**
2b. On **Betula**; ostiolar disc oval to elliptical . . . . **E. angulosa.**

Eutypella angulosa (Nits.) Sacc. **Syll. Fung.** 1:150. 1882.

TELEOMORPH: **Stromata** erumpent through bark, valsoid, bounded internally by black zoneline, oval to elliptical, ostiolar disc (1.5-)2-5(-9) mm across, with black surface. **Perithecia** polystichous, **ca.** 0.5 mm diam, embedded in mixture of host and fungal tissue. Perithecial necks somewhat elongate, indistinctly three- to five-sulcate. **Asci** clavate to spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, often with bowl-shaped apical structures, eight-spored, **p. sp.** 32-55(-65) X (5-)5.5-9 µm. **Ascospores** allantoid, slightly to moderately curved, subhyaline to subolivaceous, (5-)6-9(-10.5) X 1.5-2.5 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus appears to be widely distributed in the Pacific Northwest, and apparently is restricted to **Betula** spp. **Eutypella angulosa** resembles **E. cerviculata** in a number of features, including the bowl-shaped apical structure of the asci, but usually has larger stromata. **Eutypella angulosa** is similar to **E. sorbi**, differing mainly in host.

Eutypella cerviculata (Fr.) Sacc., **Syll. Fung.** 1:146. 1882.
Figs. 20, 33, 34.

TELEOMORPH: Stromata (Fig. 20) erumpent through bark, valsoid, internally bounded by black zoneline, circular to oval, ostiolar disc 1-3 mm across, with black surface. **Perithecia** polystichous, sometimes monostichous, **ca.** 0.4 mm diam, embedded in mixture of fungal and host tissue. Perithecial necks indistinctly three- to five-sulcate, often rather elongate. **Asci** clavate to spindle-shaped, long-stipitate, with refractive apical invaginations, and inamyloid or slightly amyloid apical rings, with bowl-shaped apical structures (Fig. 33), eight-spored, **p. sp.** (27-)37-55(-66) X (4-)4.4-7(-8) µm. **Ascospores** (Fig. 34) allantoid, slightly to moderately curved, rarely strongly curved, subolivaceous, (6-)7-10(-11.5) X (1.5-)2-3(-3.5) µm.

ANAMORPH IN CULTURE: Conidiomata enclosed, rather pycnidium-like. **Conidiogenous cells** cylindrical, proliferating percurrently. **Conidia** nearly straight to curved, with flattened bases, hyaline, (12-)15-18 X 1-1.5 µm. For further details see Glawe and Rogers, 1982b.

COMMENTS: This species is widespread in the Pacific Northwest, occurring on dead branches of **Acer, Alnus, Corylus,** and **Populus.** The identification of this species is only tentative as the teleomorph also resembles descriptions of several other species, including **E. alnifraga** (Wahlenb.) Sacc. and **E. prunastri** (Pers. : Fr.) Sacc. (Saccardo, 1882; Ellis and Everhart, 1892). Problems in the identification of **E. cerviculata** were discussed by Wehmeyer (1926).

Eutypella oregonensis Wehmeyer, **Pap. Mich. Acad. Sci.** 11:163. 1929.

TELEOMORPH: Stromata erumpent through bark, pulvinate, circular to oval, sometimes elliptical, with upper surface nearly flat to convex, margins sloping, 1-2 mm diam. Surface dark brown to black. **Perithecia** in one layer, the necks tending to converge. Entostromatic region between perithecial necks occupied by white pseudoparenchymatous tissue. Ostioles poorly developed, three- to four-sulcate. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and inamyloid apical rings, eight-spored, **p. sp.** 45-50 X 6-8 µm. **Ascospores** allantoid, slightly to moderately curved, subolivaceous (8-)9-12(-13)

X 2-3 µm.

ANAMORPH: Not seen.

COMMENTS: This fungus is known from several collections on **Alnus**, **Acer**, and **Fraxinus** from Oregon. Differences in stromatal size and shape suggest that these collections might represent more than one species. The portion of the type collection that was seen is immature; ascus and ascospore characteristics in the above description are based on a collection from **Alnus**. Stromata of this species are typical of the genus **Diatrype**, where this species would be better placed.

Eutypella sorbi (Schm. : Fr.) Sacc., **Syll. Fung.** 1:148. 1882.

TELEOMORPH: **Stromata** erumpent through bark, valsoid, bounded by black zone line, circular, ostiolar disc 1.5-7 mm diam, with black surface. **Perithecia** polystichous, **ca.** 0.5 mm diam, embedded in mixture of fungal and host tissue. Perithecial necks three- to four-sulcate, conical. **Asci** spindle-shaped, long-stipitate, with refractive apical invaginations and slightly amyloid apical rings, eight-spored, **p. sp.** 45-55 X 7-10 µm. **Ascospores** allantoid, moderately curved, subhyaline to subolivaceous, 7-9(-10) X (1.5-)2 µm.

ANAMORPH: Not seen in USA material. A Swiss isolate cultured on SME agar (Kenerly and Rogers, 1976) was as follows: **Conidiomata** indeterminate hyphal wefts. **Conidiogenous cells** cylindrical, proliferating sympodially. **Conidia** nearly straight to J-shaped, with flattened bases, hyaline, 15-22(-25) X 1-2 µm. For further details see Rogers and Glawe, 1983.

COMMENTS: This species is known in the Pacific Northwest from collections on **Sorbus**, and appears restricted to that host. These collections resemble Saccardo's (1882) description for **E. sorbi** except that the asci are about twice as wide as described by him. This fungus is similar to **E. angulosa**.

V. HOST-FUNGUS INDEX

INDEX TO HOSTS BY SPECIES OF DIATRYPACEAE

"*" denotes tentative or questionable host determination.

Cryptosphaeria populina: Populus sp., Populus tremuloides, Populus trichocarpa.

Cryptosphaeria pullmanensis: Populus trichocarpa.

Cryptovalsa sp.: *Acer circinatum.

Diatrype bullata: Alnus sp., Alnus rubra, Alnus tenuifolia, Salix sp., Salix scouleriana.

Diatrype diffindens: Pseudotsuga menziesii var. menziesii.

Diatrype disciformis: Lithocarpus densiflorus.

Diatrype microstega: Umbellularia californica.

Diatrype stigma collection group 1: Alnus sp., Acer glabrum, Crataegus sp.

Diatrype stigma collection group 2: Quercus sp., Quercus garryana.

Diatrype stigma collection group 5: Acer glabrum, Betula sp., Betula papyrifera, Rhus diversiloba, Salix sp.

Diatrype taxonomic species 1: Unidentified host.

Diatrype taxonomic species 2: Umbellularia californica.

Diatrype taxonomic species 3: Alnus rubra.

Diatrype whitmanensis: unidentified host.

Diatrypella betulina: Betula occidentalis, Betula papyrifera.

Diatrypella decipiens: Corylus sp., Umbellularia californica.

Diatrypella discoidea var. alni: Alnus sp., Alnus rubra, Alnus sinuata, Alnus tenuifolia.

Diatrypella favacea: Betula papyrifera.

Diatrypella pulvinata: Quercus sp., Quercus garryana.

Diatrypella rimosa: Alnus sp.

Diatrypella verrucaeformis: Alnus rubra.

Eutypa armeniacae: Malus domestica, Vitis labrusca, Vitis vinifera.

Eutypa flavovirens: Acer circinatum, Acer glabrum, Acer macrophyllum, Alnus sp., Alnus rubra, Amelanchier sp., *Betula sp., Ceanothus cuneatus, Malus sp., Populus trichocarpa, Quercus sp., *Quercus garryana, Sambucus callicarpa.

Eutypa taxonomic species 1: Unidentified host.

Eutypa taxonomic species 2: Unidentified host.

Eutypa taxonomic species 3: Acer glabrum var. douglasii, *Acer macrophyllum, Quercus garryana.

Eutypella angulosa: Betula sp., Betula papyrifera.

Eutypella cerviculata: Alnus sp., Alnus rubra, Alnus sinuata, Acer macrophyllum, Corylus sp., Populus trichocarpa.

Eutypella oregonensis: Fraxinus latifolia, Alnus sp.

Eutypella sorbi: Sorbus sp., Sorbus sitchensis.

INDEX TO SPECIES OF DIATRYPACEAE BY HOST SPECIES

"*" denotes tentative or questionable host determination.

Acer circinatum Pursh: *Cryptovalsa sp., Eutypa flavovirens.

Acer glabrum Torr.: Diatrype stigma collection group 1, Diatrype stigma collection group 5, Eutypa flavovirens, Eutypa taxonomic species 3.

Acer macrophyllum Pursh: Eutypa flavovirens, *Eutypa taxonomic species 3, Eutypella cerviculata.

Alnus sp.: Diatrype bullata, Diatrype stigma collection group 1, Diatrypella discoidea var. alni, Diatrypella rimosa, Eutypa flavovirens, Eutypella cerviculata, Eutypella oregonensis.

Alnus rubra Bong.: Diatrype bullata, Diatrype taxonomic species 3, Diatrypella discoidea var. alni, Diatrypella verrucaeformis, Eutypa flavovirens, Eutypella cerviculata.

Alnus sinuata (Regel) Rydb.: Diatrypella discoidea var. alni, Eutypella cerviculata.

Alnus tenuifolia Nutt.: Diatrype bullata, Diatrypella discoidea var. alni.

Amelanchier sp.: Eutypa flavovirens.

Betula occidentalis Hook.: Diatrypella betulina.

Betula papyrifera Marsh.: Diatrype stigma collection group 5, Diatrypella betulina, Diatrypella favacea, Eutypella angulosa.

Ceanothus cuneatus (Hook.) Nutt.: Eutypa flavovirens.

Corylus sp.: Diatrypella decipiens, Eutypella cerviculata.

Crataegus sp.: Diatrype stigma collection group 1.

Fraxinus latifolia Benth.: Eutypella oregonensis.

Malus sp.: Eutypa flavovirens.

Malus domestica Burkh.: Eutypa armeniacae.

Populus sp.: Cryptosphaeria populina.

Populus tremuloides Michx.: Cryptosphaeria populina.

Populus trichocarpa Torr. & Gray: Cryptosphaeria populina, Cryptosphaeria pullmanensis, Eutypa flavovirens, Eutypella cerviculata.

Pseudotsuga menziesii (Mirb.) Franco **var. menziesii**: Diatrype diffindens.

Quercus sp.: Diatrype stigma collection group 2, Diatrypella pulvinata, Eutypa flavovirens.

Quercus garryana Dougl. ex Hook.: Diatrype stigma collection group 2, Diatrypella pulvinata, *Eutypa flavovirens, Eutypa taxonomic species 3.
Rhus diversiloba Torr. & Gray: Diatrype stigma collection group 5.
Salix sp.: Diatrype bullata, Diatrype stigma collection group 5.
Salix scouleriana Barratt ex Hook.: Diatrype bullata.
Sambucus callicarpa Greene: Eutypa flavovirens.
Sorbus sp.: Eutypella sorbi.
Sorbus sitchensis Roem.: Eutypella sorbi.
Umbellularia californica (Hook. & Arn.) Nutt.: Diatrype microstega, Diatrype taxonomic species 2, Diatrypella decipiens.
Vitis labrusca L.: Eutypa armeniacae.
Vitis vinifera L.: Eutypa armeniacae.
Unidentified hosts: Diatrype taxonomic species 1, Diatrype whitmanensis, Eutypa taxonomic species 1, Eutypa taxonomic species 2.

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FIGURE LEGENDS

ABBREVIATIONS USED

SEM: Scanning Electron Microscopy
DIC: Differential Interference Contrast Microscopy
BFM: Brightfield Microscopy
PCM: Phase Contrast Microscopy

All magnifications approximate.

Figs. 1-3. **Diatrype albopruinosa** (Schw.) Cooke and **Diatrypella pulvinata.** 1, 2. **D. albopruinosa.** Apical regions of asci, showing characteristic invaginations. 1. X6860. 2. X1250. 3. **D. pulvinata.** Conidiogenous cells with scars (s) indicative of sympodial proliferation and annellations (arrows) indicative of percurrent proliferation, and attached conidium (c). X10,000. All by SEM.

Figs. 4-8. **Diatrypella pulvinata, Diatrypella favacea,** and **Diatrype stigma** Collection Group 5. 4. **D. pulvinata.** Enlargement of conidiogenous region of cell in Fig. 3. X17,150. 5. **D. favacea.** Conidiogenous cell with scars (arrows) indicative of sympodial proliferation, and developing conidium (c). X13,000. 6, 7. **D. pulvinata.** Conidiogenous cells with annellated regions (arrows) indicative of percurrent proliferation. X12,000. 8. **D. stigma** Collection Group 5. Sulcate perithecial ostioles. X100. All by SEM.

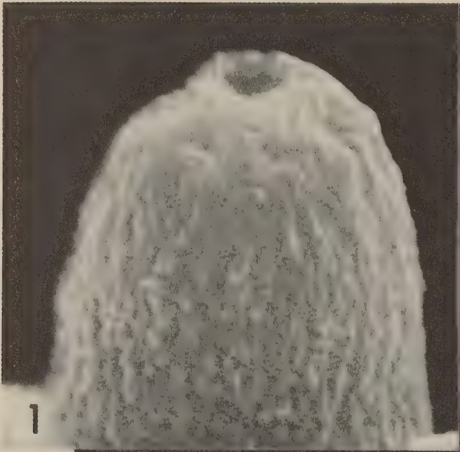
Figs. 9-15. **Cryptosphaeria populina, Diatrype stigma** Collection Group 4, **Diatrypella verrucaeformis,** and **Diatrypella discoidea** var. **alni.** 9, 10. **C. populina.** 9. Stromata, sectioned (arrow) to show perithecia embedded in bark. X1.8. 10. Longitudinal section through perithecia. X23. 11. **D. stigma** Collection Group 4. Fissured stromatal surface with perithecial ostioles. X10. 12-14. **D. verrucaeformis.** 12. Longitudinal section through two subconical stromata. X15. 13. Stroma erumpent through bark. X15. 14. Stromata, two sectioned (upper right) to show perithecia. X5. 15. **D. discoidea** var. **alni.** Group of circular stromata on host. X1.

Figs. 16-21. **Diatrypella discoidea** var. **alni**, **Eutypella cerviculata**, and **Eutypa** Taxonomic Species 1. 16-19. **D. discoidea** var. **alni**. 16. Immature stromata erumpent through bark. X8. 17. Mature stromata with characteristic shallow fissures radiating from perithecial ostioles. X10. 18. Overmature stromata. X9. 19. Longitudinal section through stroma with subtending zonelines (arrows). X11. 20. **E. cerviculata.** Longitudinal section through stroma showing perithecia (p) and zonelines (arrows). X18. 21. **Eutypa** Taxonomic Species 1. Stroma with perithecial ostioles. Portions of the stroma have been cut to show perithecia embedded in wood (lower right). X4.

Figs. 22-26. **Eutypa** Taxonomic Species 1 and **Eutypa flavovirens.** 22. **Eutypa** Taxonomic Species 1. Longitudinal section through perithecia. X20. 23-26. **E. flavovirens.** 23. Longitudinal section through perithecia, one of which (arrow) is overmature and collapsed. X60. 24. Stroma on wood, with portions cut to reveal perithecia. X7. 25. **Diatrype**-like stromata erumpent through bark, one (upper left) cut to reveal perithecia. X2. 26. Stromata which have raised blister-like areas on wood. X2.

Figs. 27-31. **Diatrype bullata** and **Diatrypella verrucaeformis.** 27, 28. **D. bullata.** 27. Long stipitate ascus. X1000. 28. Remnants of ascus following ascospore discharge. X1000. 29. **D. verrucaeformis.** Spore-bearing portion of ascus with ascospores. X1000. 30. **D. bullata.** Spore-bearing portion of ascus with ascospores. X2500. 31. **D. verrucaeformis.** Ascus after discharge of ascospores, with apex which everted during spore discharge (arrow). X1000. All by DIC.

Figs. 32-42. **Diatrypella favacea, Eutypella cerviculata, Diatrypella discoidea** var. **alni, Diatrypella betulina, Cryptosphaeria populina, Eutypa** Taxonomic Species 1, **Cryptosphaeria pullmanensis** and **Diatrype stigma** Collection group 5. 32. **D. favacea.** Apical region of ascus, by PCM. X2000. 33, 34. **E. cerviculata.** 33. Ascus with bowl-shaped apical structure (arrows) in medial optical section, by PCM. X2000. 34. Ascospores, by PCM. X2300. 35. **D. discoidea** var. **alni**. Ascospores, by PCM. X2300. 36. **D. betulina.** Ascospores, by PCM. X2300. 37. **D. favacea.** Ascospores, by PCM. X2300. 38. **C. populina.** Ascospores, by DIC. X2300. 39. **Eutypa** Taxonomic Species 1. Ascospores, by BFM. X2300. 40. **C. pullmanensis.** Conidia, by DIC. X2500. 41. **D. stigma** Collection Group 5. Conidia, by DIC. X2300. 42. **D. favacea.** Conidium, by DIC. X2300.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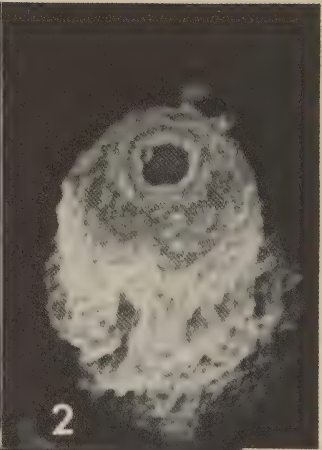
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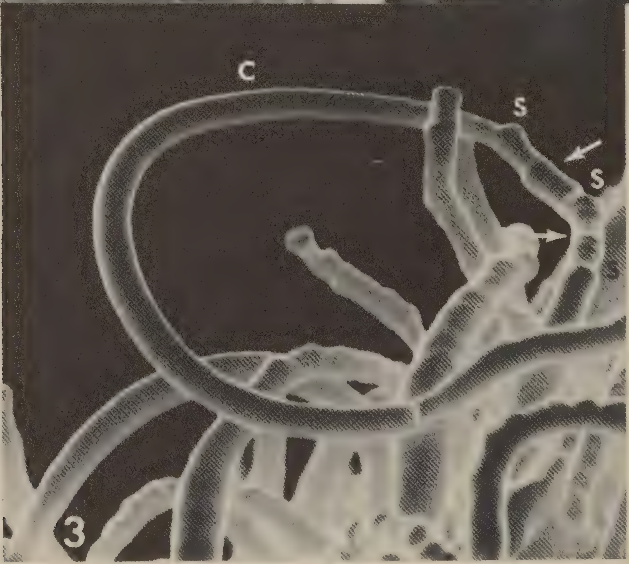
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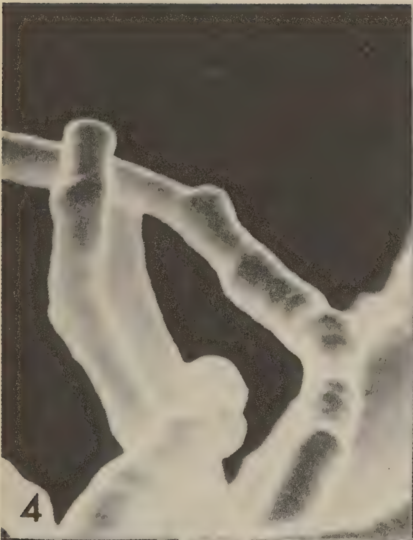
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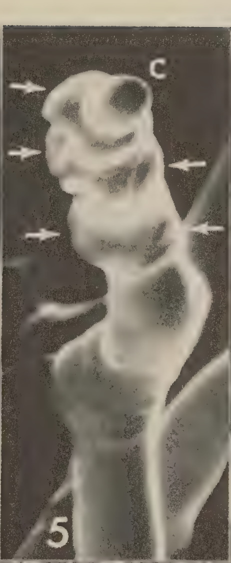

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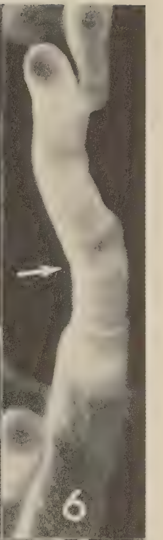
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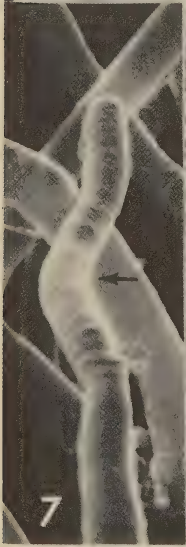
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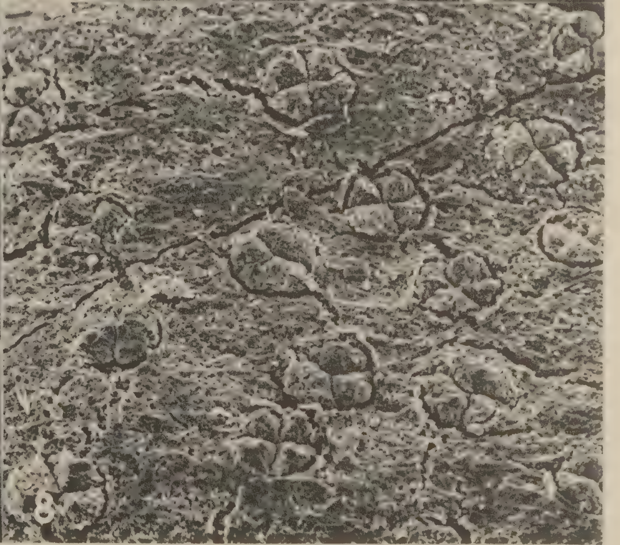
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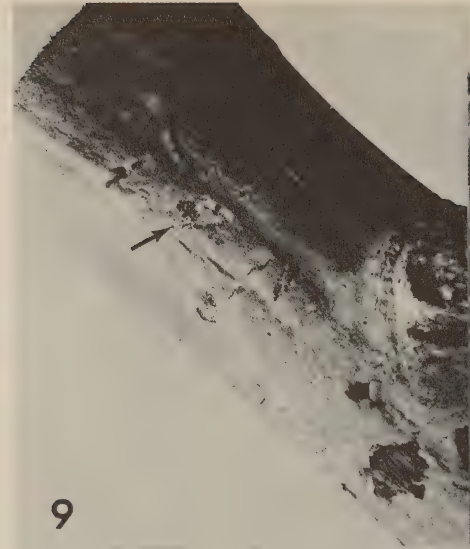
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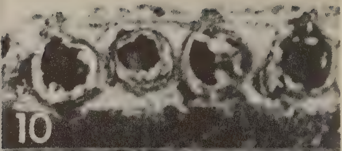
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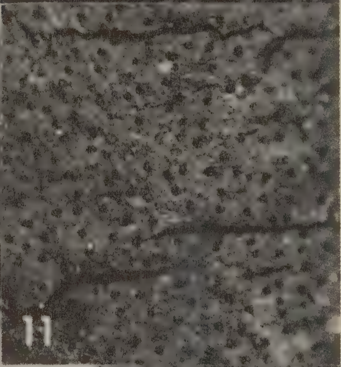
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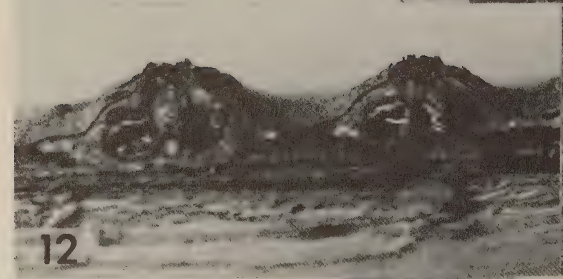
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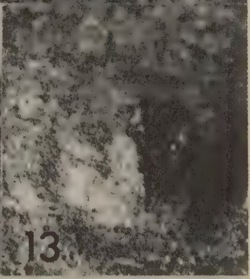
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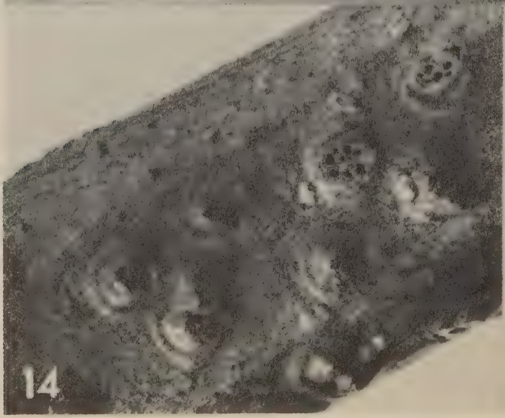
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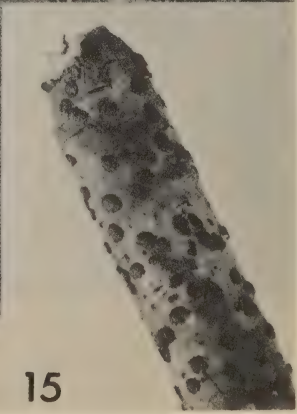
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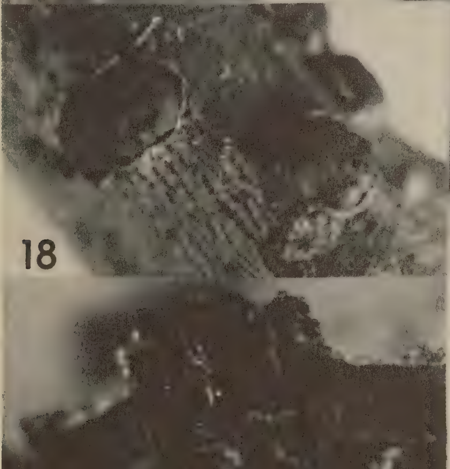

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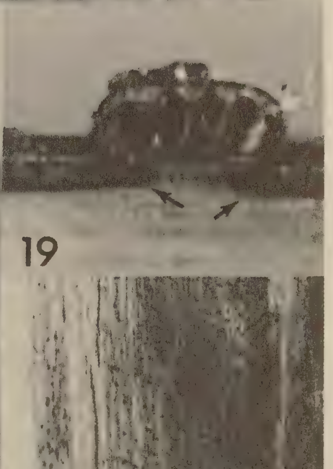

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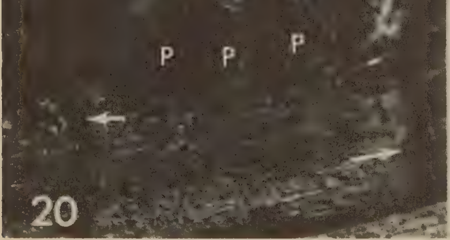

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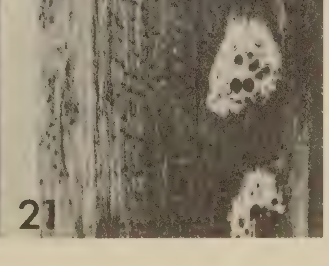

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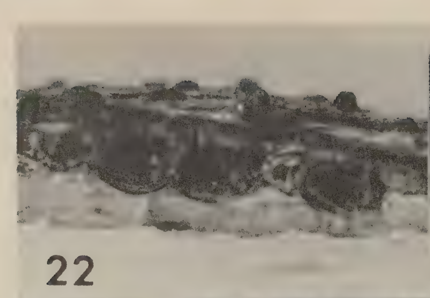
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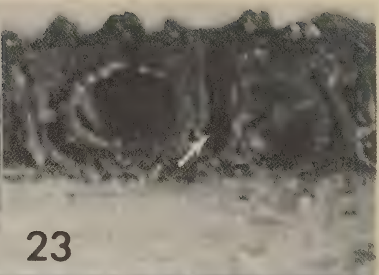
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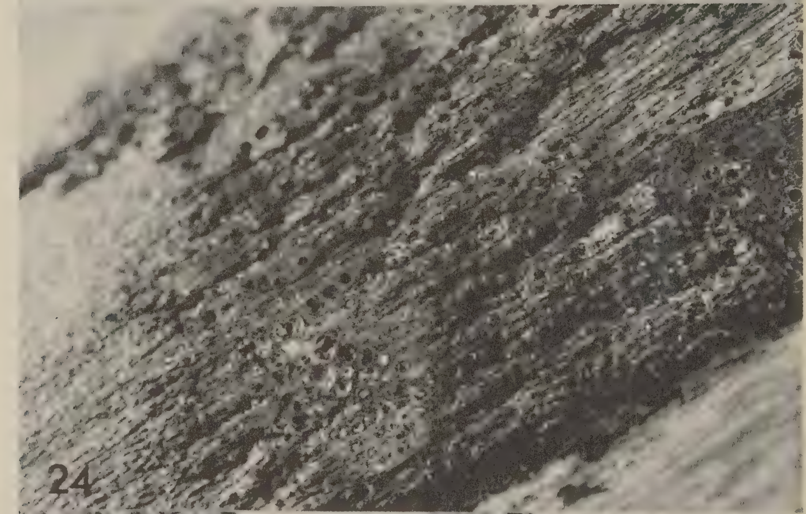
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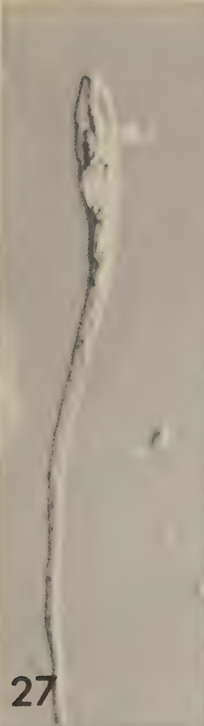
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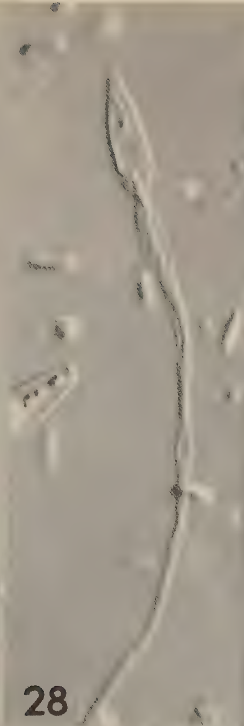
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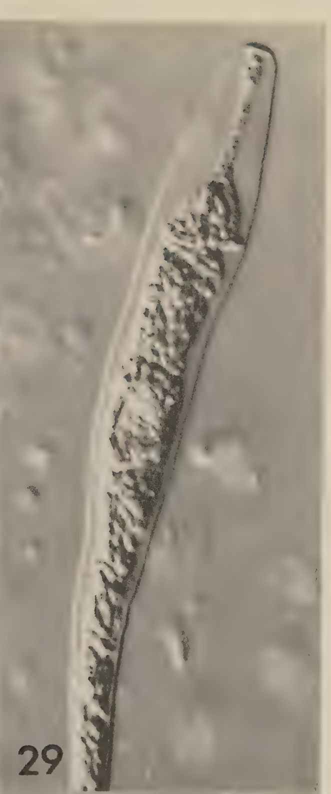
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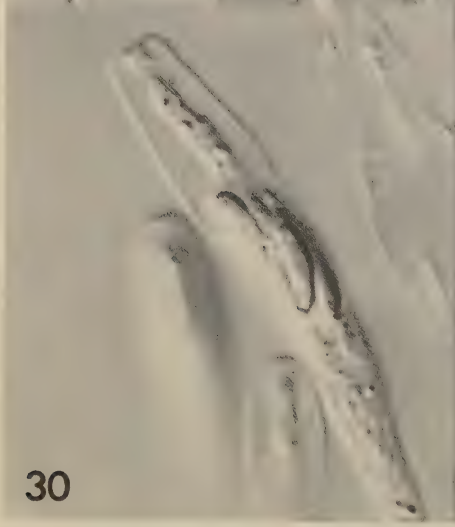
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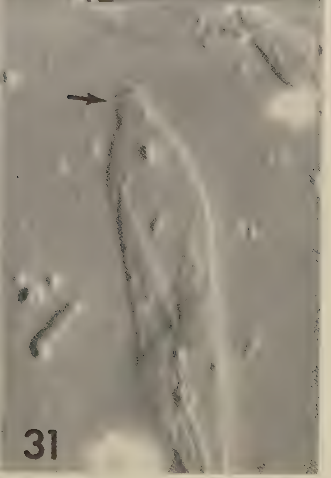
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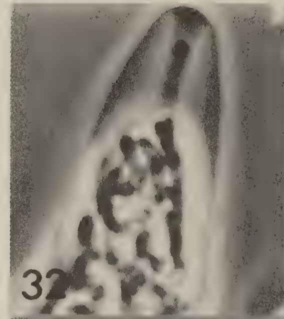
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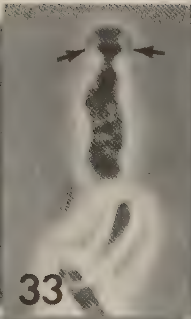
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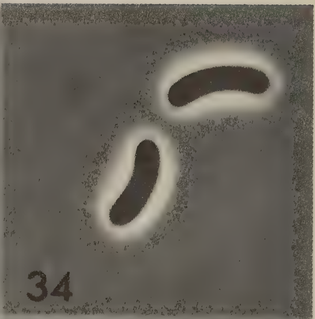
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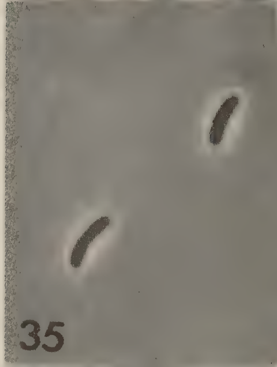
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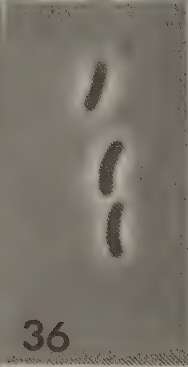
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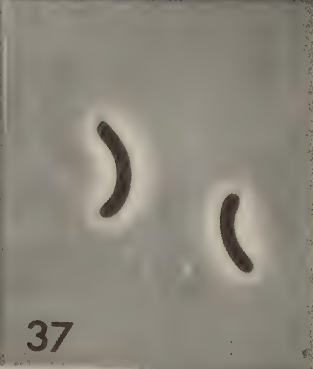
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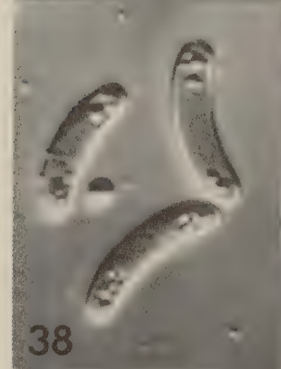
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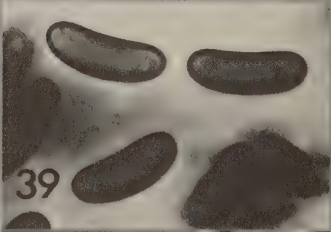
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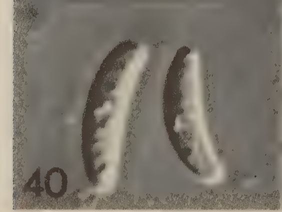
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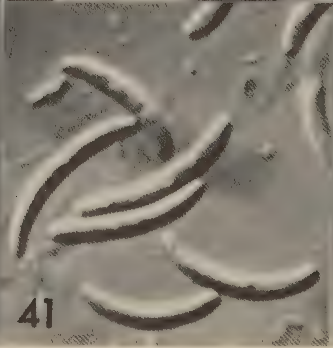
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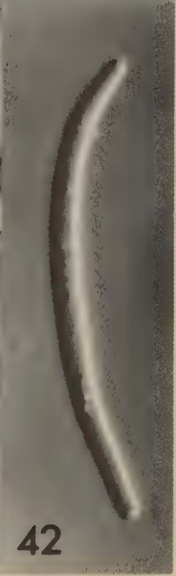
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MYCOTAXON

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CORTINARIUS IODES VERSUS CORTINARIUS HELIOTROPICUS

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SUMMARY

Cortinarius iodes, a species in the subgenus Myxacium, is fully described. To date it has been found with certainty only in eastern North America. Cortinarius heliotropicus is a synonym of C. iodes.

Two names, Cortinarius iodes and C. heliotropicus, have been used for a common and widely distributed species of the subgenus Myxacium in eastern North America. Of the identified collections examined during this study the majority were named Cortinarius iodes by earlier workers. Our studies show that Cortinarius heliotropicus is a synonym of C. iodes.

The monograph of Cortinarius by Kauffman (1932) separated Cortinarius iodes and C. heliotropicus on the basis of basidiospore length and basidioma odor. The former species was described as having "spores 8-10 µm long; odor not of radish" and the latter as having "spores 10-12.5 µm long; odor of radish." For Cortinarius heliotropicus Kauffman basically gave the basidiospore measurements and odor as reported by C.H. Peck (1905) in the original description of the species. The basidiospore measurements given for Cortinarius iodes by Kauffman (1932) is the same as that on one of his note cards dated

August 12, 1912. This collection, identified as "*Cortinarius* (*Myxacium*) *iodes* B. & C.," was made by a Mrs. J.A. Cahn in Detroit, Michigan. On the card, following his notes on the fresh material, was the following notation, "spores agree with B. & C. specimen at Harvard, 8.8 x 6.6 ." Kauffman no doubt saw the isotype of *Cortinarius iodes* at the Farlow Herbarium and used basidiospore measurements from this material as the basidiospore size for the species. In Kauffman's key choices the lack of a radish odor was a second feature of *C. iodes*. The note card for the Cahn collection had: odor none. The differences between *Cortinarius iodes* and *C. heliotropicus* noted by Kauffman (1932) appear to be the reasons that certain workers over the years have attempted to use the two names *Cortinarius iodes* and *C. heliotropicus*.

Is there any indication that earlier workers thought that *Cortinarius iodes* and *C. heliotropicus* might be the same taxon? In another notation by C.H. Kauffman one gets the impression that he might have been very close to deciding that they were the same species. In June 1916, he placed a note in a collection from Sand Lake, New York (S.L. July) at the Peck Herbarium (NYS). It reads as follows: "Spores 9-12 x 6-7. This is identical with Peck's type of *C. heliotropicus*. Is *C. iodes* B. & C. the same? I am nearly convinced." This collection as received by the senior author from the New York State Museum is labeled "*Cortinarius* (*Myxacium*) *iodes* B. & C." Another worker, L. C. C. Kreiger, identified a collection made by D. W. Weir, September 15, 1911, in Boston, Massachusetts as "*Cortinarius heliotropicus* (=*C. iodes*)." He certainly believed there were two names for one species. More recent workers, such as Alexander H. Smith, primarily have used the name *Cortinarius iodes* for this common eastern North American species.

A comparison of the holotype of *Cortinarius iodes* and the holotype of *Cortinarius heliotropicus* show that microscopically they cannot be considered separate species. Also, the isotype of *Cortinarius iodes* at the Farlow Herbarium is in agreement with these holotypes. These studies together with a comparison of the original descriptions for each name and an evaluation of collections from eastern North America clearly show that the two names apply to one taxon. *Cortinarius iodes* is the earlier of the two names and must be used as the species name.

In this study all microscopical data was taken from sections or pieces of dried basidiomata which were mounted in a 3% aqueous solution of potassium hydroxide. Photographs of basidiospores were taken with a JEOL scanning electron microscope. Basidiospores were coated with gold-palladium (60/40) in a sputter-coater to an approximate thickness of 200-300 A°. Capitalized color notations are from Ridgway (1912). Collections cited under 'COLLECTIONS EXAMINED' are deposited in the University of Washington Herbarium (WTU) unless otherwise noted by use of an abbreviation from _Index_ _Herbariorum_.

Cortinarius _iodes_ Berkeley and Curtis, Ann. Mag. Nat. Hist. Ser. 2, 12:423.1853.

Cortinarius _heliotropicus_ Peck, Bull. N.Y. State Mus. 94:22.1905.

Figs. 1-5

PILEUS 20-60 (-115) mm broad, subhemispherical, conic-convex, convex-campanulate or obtusely campanulate to convex, at times becoming more obtuse or plane to somewhat uplifted in age; disc obtusely umbonate to more or less flattened; margin inrolled then incurved to decurved, opaque; surface glutinous to viscid when fresh, sometimes with a separable pellicle, at times somewhat hygrophanous, glabrous, lightly streaked to innately fibrillose or fibrillose-virgate, overall color dark violet, purplish, lavender or bluish violet, usually becoming paler with age (Dull Bluish Violet (2), Dusky Dull Violet, bright Dark Dull Bluish Violet (2), or Aniline Lilac fading to Lavender or Light Grayish Blue Violet), disc and often the inner margin becoming shaded or mottled yellowish to yellowish buff or occasionally rusty yellow (Warm Buff, Light Buff, Straw Yellow or Antimony Yellow). Context solid, subpliant, up to 10 mm thick on the disc, abruptly to more or less gradually thinner toward the margin, color about like the pileus surface or violet-gray to bluish white, fading in age to pallid, watery gray or sometimes sordid a dingy buff. Taste of gluten (pellicle) mild to slightly acid, not bitter, flesh mild or slightly bitter-raphanoid, raphanoid or bitterish. Odor none, mild or somewhat pungent to agaricoid, raphanoid or of stale coffee. Potassium hydroxide (3%) gives no color change or only slightly more purplish on the pileus surface, on the context it gives a slightly gray to gray brown reaction.

LAMELLAE at first violaceous, pale dull lilac, grayish blue lilac, Dusty Dull Violet, pale dull bluish violet gray (Lavender Gray) or concolorous with the pileus surface, becoming light brown mixed with lavender, Clay Color mixed with pale dull lilac, violaceous cinnamon or finally near Mikado Brown, usually lavender to lilac tones remain evident, not staining, adnate to slightly sinuate or somewhat decurrent, in age sometimes more adnexed, somewhat narrow to medium broad, up to 10 mm wide, broadest toward the base, usually close to crowded, sometimes subdistant, moderately thin; edges even to slightly uneven.

STIPE 38-65 (-80) mm long, (4-) 6-14 (-20) mm thick at the apex, 5-20 mm thick at the base, sometimes equal or tapered slightly downward, usually clavate or clavate-bulbous; surface somewhat furfuraceous at the apex, otherwise much of surface glutinous to subviscid from a coating

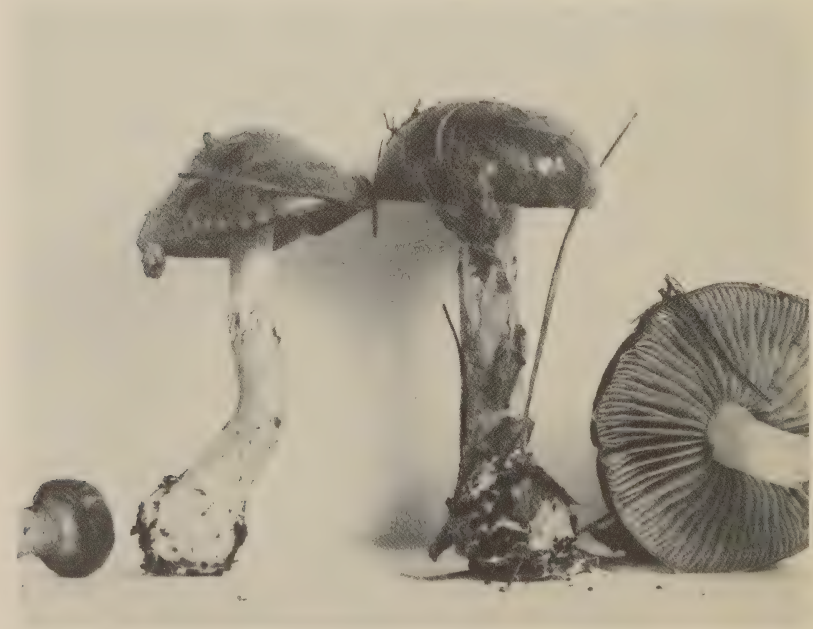
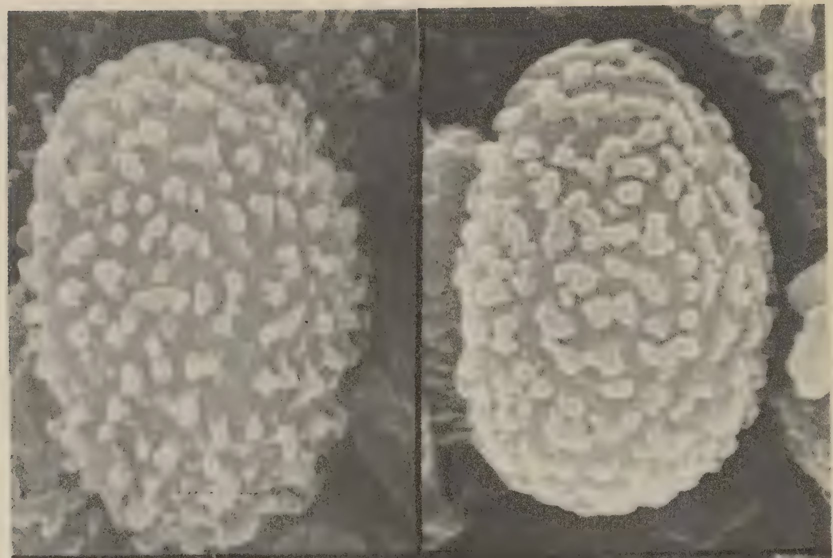
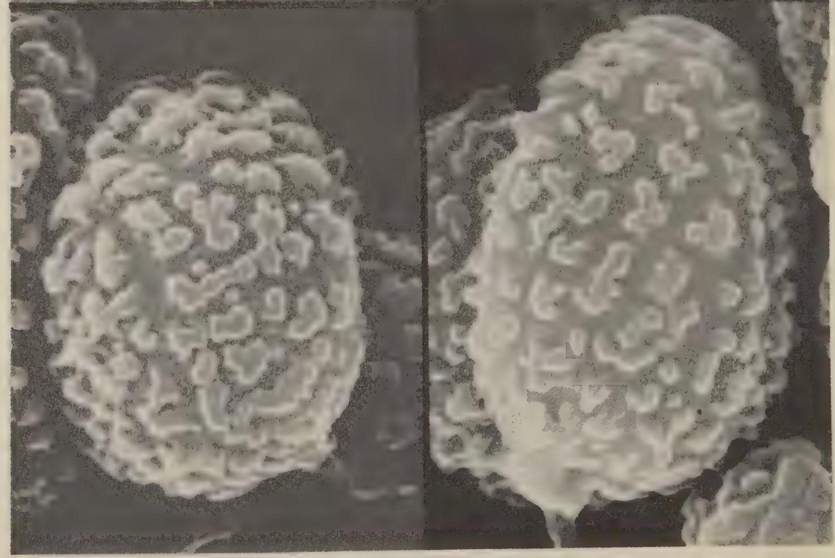


Figure 1: Cortinarius iodes, Peck Bigelow N. 7606 X 1

of hyaline gluten when fresh, as gluten dries the surface may become innately silky fibrillose to more fibrillose in appearance, color of apex pale bluish lilac, pale bluish, bluish pallid or more violaceous to lavender at first, usually paler in age and finally nearly white at times, below apex pale lavender to pale bluish lilac or more frequently pallid to whitish or stained yellowish or sordid brownish, especially toward the base, the base often with white mycelium and sometimes with white mycelial strands. Context solid or tunneled by larvae, color whitish to somewhat watery gray with grayish lavender or lavender in the apex and upper cortex (lavender color usually fades with age), sometimes brownish sordid, especially in age. CORTINA white or slightly lavender to pale violaceous, leaving a slight apical zone at most.

BASIDIOSPORES (8.5-)9.1-12.4(-16.1)x(5.8-)6.3-7.7 (-9.9-11.0) µm, in profile view inequilateral, broadly elliptic to elliptic, often with a more or less flattened supra-hilar region, in face view elliptic to broadly elliptic or somewhat ovate, verruculose to somewhat tuberculate, more or less pale to light medium brown with darker brown ornamentation. BASIDIA 4-sterigmate, 28-39.5 x (6.0-)9.3-14 µm, clavate to broadly clavate, hyaline to slightly grayish or faintly violaceous (diffuse pigment), some with hyaline to yellowish refractive granules; walls basically hyaline refractive, and thin. PLEUROCYSTIDIA AND CHEILOCYSTIDIA absent, lamellar edges composed of basidia and basidioles. SUBHYMENIAL HYPHAE narrow, cylindrical, similar to lamellar trama hyphae in color. TRAMAL HYPHAE OF LAMELLAE subparallel to somewhat interwoven, 4.4-31 µm wide, cylindrical to inflated, hyaline or with diffuse violaceous pigment, hyaline to yellowish refractive granules may be present, walls more or less thin, refractive, hyaline to yellowish. CUTICULAR HYPHAE OF PILEUS often forming a layer 110-125 µm thick, in older or poorly preserved specimens the layer may be thinner or less distinctive, embedded in a thin hyaline matrix, interwoven, somewhat radially oriented, branched, 3-8 µm wide, cylindrical, basically hyaline, commonly containing hyaline or yellowish refractive granules, walls thin, refractive, hyaline, often encrusted, particularly in area adjacent to the pileus trama. TRAMAL HYPHAE OF THE PILEUS interwoven or somewhat parallel in arrangement particularly in area adjacent to the pileus cuticle, more or less radially oriented, especially above, 5.4-33.5 µm wide, cylindrical to inflated, hyaline to pale violaceous,





Figures 2 and 3 (top set, left to right): *Cortinarius iodes* basidiospores (holotype) X 8000.

Figures 4 and 5 (bottom set, left to right): *Cortinarius heliotropicus* basidiospores (holotype) X 8000.

some hyaline to yellowish refractive granules present, walls thin, refractive, mainly hyaline, some encrusted, especially in upper portion of trama. CORTICAL HYPHAE OF THE STIPE parallel to subparallel or slightly interwoven, mainly 3.7-20 µm wide, cylindrical to inflated, mainly hyaline, commonly containing hyaline to yellowish refractive granules, sometimes encrusted; well differentiated CAULOCYSTIDIA absent, occasional hyphal end cells may be projecting from surface and some decurrent hymenial elements present on stipe apex. VEIL HYPHAE often coating midstipe region, gelatinous matrix not well defined, basically interwoven, 3-8(-9.1) µm wide, cylindrical, branched, hyaline to pale violaceous, hyaline to yellowish refractive granules may be present, walls thin, refractive, hyaline, some encrusted. CLAMP CONNECTIONS present throughout the basidiomata.

HABIT, HABITAT, PHENOLOGY - Scattered to gregarious, less commonly solitary; terrestrial, occurring in leaf mold, litter and humus, among mosses or in bare soil. Found at the edges of bogs, in swampy areas, on hummocks, in low woods, along streams or sometimes in sandy forest soils. Typically in forested areas, mixed woods, mixed hardwoods, beech-maple woods, oak woods. Most often found in areas where Quercus is present (white pine and oak; oak and Acer rubrum; oak, maple, hemlock and pine; live oak; maple, oak and poplar). Basidiomata produced from early June to late December, depending somewhat on geographical location. Specimens have been found most often from July to November; however, in the Mississippi-Louisiana region, collections have been made as early as June and as late as December.

COLLECTIONS EXAMINED - CANADA. Ontario: J.F. Ammirati 7294. Quebec: R. L. Shaffer 5752 (MICH). UNITED STATES. Connecticut: H.E. Bigelow 17992 (MASS); C.H. Kauffman, August 7, 1903 (MICH); Florida: R. Singer F.590 (MICH). Louisiana: H.E. Bigelow 17662 (MASS). Maine: W. Litten (J.Z. Hrbek), August 13, 1983. Maryland: J.F. Ammirati 6517; D. Farr 2128 (BPI). Massachusetts: H.E. Bigelow 7226, 7302, 7473, 7506, 7560, 7606, 7607, 7608, 7609, 8258, 8471, 9215, 9623, 9926, 14709, 15186 (all MASS); H.P. Burt, September 13, 1905, New Bedford (NYS); S. Davis, August 14 and 18, 1905, Stow (MICH); G.E. Morris, August 10, 1909, Stow (MICH); D.W. Weir, September 15, 1911, Blue Hills Reservation (MICH). *Michigan*: J.F. Ammirati 2633 (MICH); J.A. Cahn, August 12 (18), 1912, Detroit (MICH); C.H. Kauffman, August 12, 1912, Detroit (MICH); F. Hoseney and C. Nimke, August 2, 1973, Waterloo Recreation Area (MICH); W. Patrick 2270, 2398 (both MICH); R.L. Shaffer 2007 (MICH); A. H. Smith 5035, 18475, 18619, 84258, 84288, 84397 (all MICH). *Mississippi*: W. Cibula 1338 (MICH); D. Guravich 1579 (MICH). *New Hampshire*: H.E. Bigelow 12456 (MASS); F.W. Holmes 79 (MASS). *New York*: A.M. Baker, September 11, 1911, Long Island; C.H. Peck, Smithtown, August 30, 1904 (holotype, *Cortinarius heliotropicus* Peck), Wading River, August 24, 1905, Sand Lake, July, and Osceola, August (all NYS). *North Carolina*: D. Guravich 979 (MICH); L.R. Hesler 14359 (MICH); C.W. Waters, August 21, 1924, Hot Springs (MICH). *Pennsylvania*: W. Herbst, December 1897 (FH), H.A. Kelly 1722 (MICH); C.H. Kauffman, September 5, 1924, Mt. Gretna, September 8, 1926, Mt. Gretna, and September 13, 1926, Mt. Gretna (all MICH); D.M. Simons 1950. *South Carolina*: H.W. Ravenel 1090/M.A. Curtis 2895 (holotype, *Cortinarius iodes* Berkeley and Curtis (K) and isotype *Cortinarius iodes* Berkeley and Curtis (FH)). *Tennessee*: A.H. Smith 10078 (MICH). *Texas*: D.R. Lewis 1233 (MICH); A.H. Smith 88428, 88452 (both MICH). *West Virginia*: H.C. Beardslee, August 1900 (MICH), Summer 1900 (4-634) (FH).

DISCUSSION - The glutinous to viscid stipe and pileus of *Cortinarius iodes* places it in the subgenus *Myxacium*. In fresh material these features are usually obvious. However, in older specimens the viscidity of the stipe in particular may be difficult to discern and one may look for this species in the subgenus *Phlegmacium* of which it is not a member. Studying the midstipe region microscopically will normally reveal a thin gelatinous matrix and always a coating of interwoven, narrow hyphae similar to those making up the pileus cuticle. A section of the pileus cuticle, even in dried specimens, will clearly show a gelatinous matrix. The violet to bluish color of the pileus, and the presence of similar colors on the stipe and lamellae of fresh specimens are indicative of the section *Delibuti*. The yellowish discolorations on the surface of the pileus and midstipe, together with the broadly elliptic basidiospores also place *Cortinarius iodes* in this section.

Cortinarius iodes in general is a very distinctive

TABLE I

Basidiospore measurements in µm for specimens of *Cortinarius iodes* from different geographical locations. Based on a random choice of ten basidiospores from each basidiomata.

Collector	Collection No./Date	Location	Range of Length	Range of Width
Ammirati, J.A.	2633	Portage Township, Michigan	8.9 - 11.8	6.3 - 8.8
Cahn, J.A.	August 12 (18), 1912	Detroit, Michigan	8.9 - 11.8	6.3 - 7.4
Peck, C.H.	August 30, 1904 (holotype *C. heliotropicus*)	Smithtown, New York	8.8 - 12.2	6.1 - 8.1
Ravenel, A.W.	1090 (holotype *C. iodes*)	South Carolina	8.5 - 13.1 (-16.1)	5.9 - 8.8 (-11.0)
Smith, A.H.	84288	Waterloo Recreation Area, Michigan	8.5 - 10.1	5.8 - 7.0
Smith, A.H.	88452	Cleveland, Texas	8.5 - 11.1	5.9 - 7.0

and conspicuous species in eastern forests of North America, mainly in mixed or hardwood forests and frequently where oak (Quercus) is found. Confusion over the identification of Cortinarius iodes and attempts to separate it from C. heliotropicus and similar species has mainly revolved around differences in basidiospore measurements as reported by Kauffman (1932). Studying specimens from different geographical locations including the holotype of each species indicates that basidiospore size is somewhat variable but cannot be used to separate Cortinarius iodes and C. heliotropicus. See Table I for basidiospore measurements of several collections of C. iodes. That odor cannot be used to separate these species is clearly evident by the range of odor given in the description.

In North America, the Cortinarius species most commonly confused with C. iodes is C. iodeoides Kauffman, because they are similarly colored. The latter species has smaller (7.7-9.3 x 4.6-5.4 μm), particularly narrower, elliptic basidiospores and a bitter pileus cuticle (pellicle). The presence of Cortinarius salor Fries has not been determined for certain in North America. According to Moser (1983) it has subglobose, smaller, 7-9 x 6-8 μm, basidiospores which would separate it from C. iodes.

Basidiospore ornamentation of Cortinarius iodes as seen with the scanning electron microscope (Figs. 2-5) is similar in pattern and appearance to that of C. delibutus Fries (Ammirati and Laursen, 1982).

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Acknowledgements

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A NOTE ON TRICHOLOMA NIVEIPES

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An unnamed *Tricholoma* species has been collected for years in Massachusetts under *Pinus rigida* Mill. and recently in the Great Lakes Region under *Pinus banksiana* Lamb. The inability to assign a name to the fungus has been a source of frustration to those collecting it. The species is of particular interest to mycophagists in Massachusetts where it is collected for food. The senior author's study of Peck's types now allows us to identify this fungus as *Tricholoma niveipes* Peck. In this paper, we provide a complete description of *T. niveipes*, discuss its distinguishing features, and discuss its infrageneric placement in the genus.

In the description below, microstructures were studied in aqueous 2.5% KOH and the color terms in parentheses are from Kelley (1965). Spore shapes were assigned following the l/b ratios given by Bas (1969).

Tricholoma niveipes Peck, Torrey Bot. Club Bull. 29(2): 69. 1902. Figs. 1-4.

PILEUS 30-85 mm in diam; hemispheric to convex with a decurved to incurved margin when young, convex, irregularly convex or plano-convex when mature, occasionally

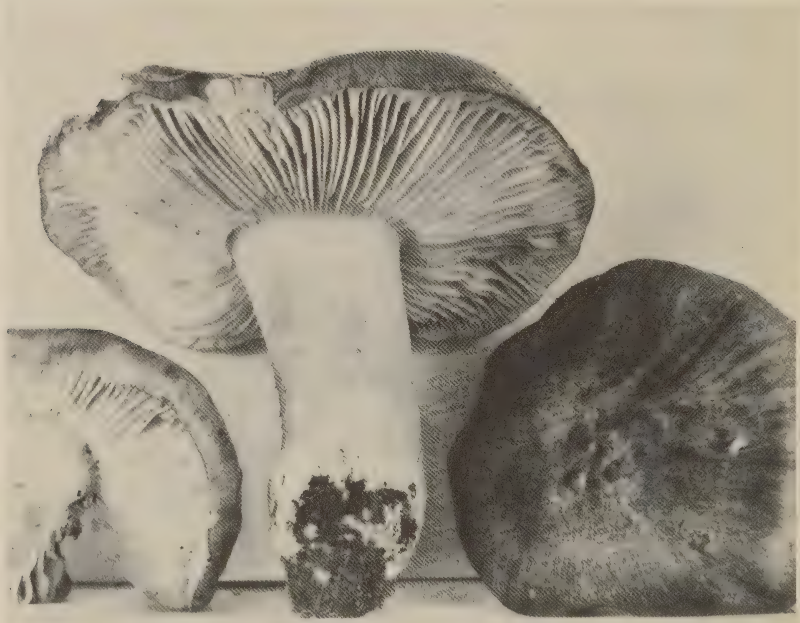


Fig. 1. Tricholoma niveipes (Halling 2385). Carpophores, x 1.

with a low, broad umbo; margin plane or decurved and frequently uplifted or undulate; surface viscid when fresh but soon dry, matted-fibrillose over the disc, elsewhere virgate with blackish fibrils, occasionally glabrous in places or nearly overall; dark grayish black to purplish black (267 Black, 235 p Black, 24 r black, 234 d. p Gray, 230 blackish P) over the central region or nearly overall, light gray (63 l. br Gy) or sometimes faintly pinkish gray (223 p Gray) on the margin, occasionally almost white near the edge, sometimes zonate or with scattered dark grayish black streaks; context 3-10 mm thick, white to light gray, unchanging; odor and taste of context farinaceous.

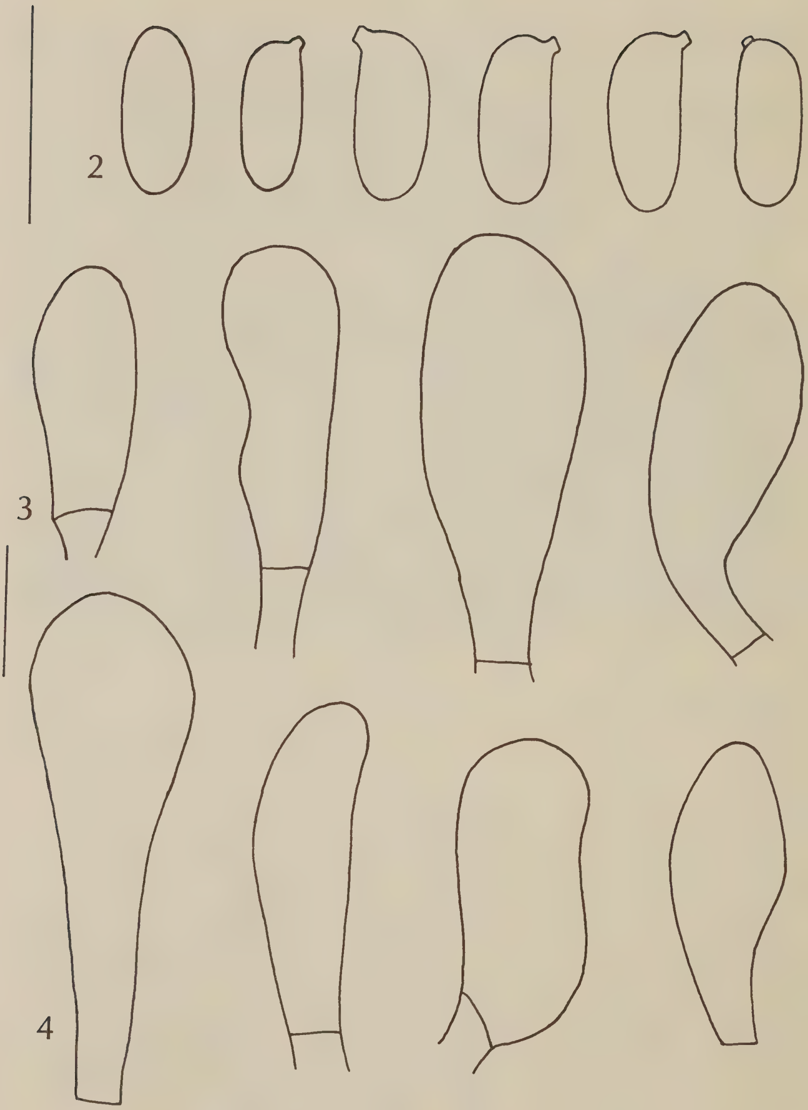
LAMELLAE 5-12 mm wide; arcuate when young, sinuate, sinuate-adnexed or emarginate when mature; white to pale gray, not discoloring; entire; close; lamellulae numerous but not arranged in distinct tiers.

STIPE 10-75 mm long, 10-25 mm thick; equal to subclavate, the base rounded; surface silky-fibrillose but often lightly scabrous or subsquamulose at the apex or at times elsewhere; white but occasionally light gray in places; context solid or occasionally becoming hollow with age, fleshy-fibrous, white, unchanging.

CHEMICAL COLOR REACTIONS: PDAB and 2.5% KOH no reaction on fresh carpophores.

SPORES white in deposit; 6.9-8.3(-9) X 2.8-3.8 µm ($\underline{E}$ = 2.0-2.66, $\underline{E}^m$ = 2.3), in profile cylindric to elongate (often very narrowly elliptic), occasionally adaxially flattened or rarely suballantoid, cylindric to elongate (often very narrowly elliptic) in face view, round in polar view; smooth; thin-walled, hyaline, inamyloid, walls acyanophilic. BASIDIA 27-35 X 6.2-7.6 µm; 4-spored; clavate; hyaline; siderophilous granules absent. HYMENIAL CYSTIDIA absent, or present as cheilo- and pleurocystidia; 20-35(-40) X 7.6-15 µm; cylindric, clavate, broadly clavate or sphaeropedunculate; smooth; thin-walled; clear or granular-guttulate; hyaline. CAULOCYSTIDIA 10-31 X 3.5-10.4 µm; arising as recurved end cells at stipe apex; cylindric, clavate or sphaeropedunculate; smooth; thin-walled; hyaline. HYPHAE OF LAMELLAR TRAMA 2.8-14 µm broad; parallel; cylindric to slightly inflated; hyaline. HYPHAE OF SUBHYMENIUM 2.1-2.8 µm broad; cylindric; hyaline. HYPHAE OF PILEUS CUTICLE 2.1-7.6 µm broad; radially interwoven in a gelatinous matrix; cylindric; smooth and thin-walled or roughened and thickened with hyaline to grayish brown incrustations; hyaline to light grayish brown, the pigmentation most often located where the cuticle and trama intergrade resulting in a grayish brown band. HYPHAE OF PILEUS TRAMA 2.8-12.4 µm broad; near the cuticle interwoven at the disc and radially arranged at the margin; cylindric to slightly inflated; hyaline. HYPHAE ON STIPE SURFACE 2.8-8.3 µm broad; longitudinal but at the apex often interwoven; cylindric; smooth; thin-walled; hyaline. HYPHAE OF STIPE TRAMA 3.5-3.8 µm broad; parallel; cylindric to slightly inflated; hyaline. HYPHAE ON STIPE BASE 2.1-3.5 µm broad; interwoven; cylindric; smooth; thin-walled; hyaline. CLAMP CONNECTIONS absent.

Gregarious to scattered, occasionally in fairy rings, in sandy soil under *Pinus rigida* or *Pinus banksiana*. September-October.



Figs. 2-4. Tricholoma niveipes. 2. Basidiospores (Halling 2764). 3. Cheilocystidia (Baroni 3603). 4. Pleurocystidia (Baroni 3603). Scale line equals 10 µm.

COLLECTIONS STUDIED: MASSACHUSETTS: Barnstable Co.: South Yarmouth, October, S. Davis (holotype). Hampden Co.: North Wilbraham, 20 Oct 1970, E. Jurkowski. Franklin Co.: Green Pond Rd, Montague, 20 Oct 1977, Baroni 3337 & 3334, Halling 2385, 7 Oct 1978, Baroni 3602, 3603 & 3605, Halling 2764, 2765, 2766 & 2767, 22 Oct 1978, Halling 2801, 2802, 2803, 2804 & 2805, 6 Oct 1979, Bigelow 18135, Halling 3251 & 3274. MICHIGAN: Marquette Co.: Hwy 28, E of Marquette, I. Bartelli 10.5.78/1 & 10.5.78/7, 24 Sept 1982, Ovrebo 1484. WISCONSIN: Adams Co.: 4 mi N of Wisconsin Dells, 2 Oct 1981, Ovrebo 1323. (holotype at NYS; Baroni, Ovrebo and Bartelli collections at MICH; Halling collections at FH; Bigelow and Jurkowski collections at MASS).

OBSERVATIONS: The long, narrow spores, dark grayish black to purplish black, viscid pileus and white to pale gray lamellae are the salient features of _Tricholoma niveipes_. The pileus can be dark-colored overall but generally the margin is lighter gray and sometimes faintly pinkish tinted. Peck described the pileus surface as being dry. However, it is likely that he collected older carpophores since examination of the holotype confirmed that the cuticular hyphae were embedded in a gelatinous matrix. The sides of the spores are not always perfectly parallel as the strict use of the term "cylindric" denotes. Rather, and as indicated in parentheses in the description, the sides can be slightly convex giving the spores a very narrow, elliptic shape.

Hymenial cystidia were present together as cheilo- and pleurocystidia in nine of the collections studied including the holotype. In some cases, collections made on the same date from the same general locality varied as to the presence of cystidia. Basidiocarps with and without cystidia were similar in every other respect. Thus, this character is variable in _T. niveipes_.

Tricholoma niveipes belongs in subg. _Tricholoma_ sect. _Tricholoma_ stirps _Portentosum_ (Singer, 1975) and is most closely related to _T. portentosum_ (Fr.:Fr.) Quél., also an edible species. Both species are viscid, virgate, possess the blackish pileal coloration and occur under conifers. _Tricholoma portentosum_ differs by having broader spores (5.7-7.6 X 3.3-3.8 µm, $\underline{E}$ = 1.56-1.76, $\underline{E}^m$ = 1.70), greenish yellow coloration to the lamellae and stipe, and a pileus that generally contains some yellow or olive coloration especially near the edge. Contrary to what Peck stated in the protologue, *T. niveipes* is not closely related to *Tricholoma terreum* (Schff.:Fr.) Kummer since the latter is truly a dry-capped species.

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AGARICUS BRUNNESCENS PECK AND AGARICUS BISPORUS (LANGE) IMBACH

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SUMMARY

Agaricus brunnescens Peck is redescribed and found to be different from A. bisporus (Lange) Imbach. The commonly cultivated mushroom is not A. brunnescens but A. bisporus.

Mycologists working in the field of mushroom growing, especially those not directly interested in taxonomy, refer to the commonly commercially cultivated white mushroom as Agaricus bisporus (Lange) Imbach while others influenced by an aricle by David Malloch (1976), prefer the undoubtedly earlier name A. brunnescens Peck. The height of confusion was reached at IMC 3 in 1983 where the communications appeared almost evenly divided, using either one or the other name for the same fungus. This situation became even more unsatisfactory when the Sydney Congress ruling on "Nomina specifica conservanda" decided to create a committee on the conservation of names of economically important species.

The question to be decided by taxonomists is this: Is A. bisporus actually, as claimed, a synonym of A. brunnescens? This question has not been answered by Malloch who adds to his data on the material conserved at the New York State Museum and the Farlow Herbarium (FH) an explicit description of what appears to be A. bisporus or a mixture between the two species. In order to answer this question correctly, we shall first describe a fresh collection which, in every detail, coincides with the original description of A. brunnescens, including habitat, unchanging context and predominatingly 2-spored basidia.

Agaricus brunnescens Peck, Bull. Torr. Cl. 27: 16. 1900.

Pileus gray to fuscous gray ("thrush" to "Chukker" br) and white towards the margin, eventually more brown or reddish brown, at first subfibrillose-areolate becoming more fibrillose or fibrillose-subsquamulose, dry, hemispheric then convex to somewhat applanate, 53-96 mm broad; margin at first incurved, appendiculate by fragments of the white veil.-- Lamellae at first pallid, soon pale pink, then argillaceous-gray, at full maturity color of the spore print (dark purplish brown), with pallid edge, close, rather narrow at least at first, free or subfree.-- Stipe white or whitish, at times slightly silky, naked except for the annuli, solid, later stuffed and (on drying) hollow, equal or subequal, about 30-35 mm long and 15-16 mm broad; veil forming an upper firmly membranous, white annulus, this well developed and persistent, subsmooth or smooth; below, a second annulus which is also white, membranous, but much narrower, often fugacious: basal mycelium white. - Context white, unchanging even when quite fresh, after days in places (handled surfaces of stipe) tending to become melleous to cinnamon; odor none or insignificant; taste mild.

Spores 5.5-8.5 x 4.5-5.5-(5.8) um, e. gr. 8.5 x 5.3 um, 6.3 x 4.5 um, or 5.5 x 4.5 um, subglobose to ellipsoid, with smooth, deep brownish purple wall up to 1 um thick, without apical germ pore. Hymenium: Basidia 13-30 x 4.5 um, at first either (1)-2- or 4-spored, later predominantly 2-spored, Cystidia none. Cheilocystidia numerous, crowded at the edges, some invading the sides of the lamellae, some somewhat projecting beyond the basidia, 11.5-40 x 5-11 um, club-shaped, fewer ventricose, hyaline. -- Hyphae hyaline, without clamp connections, not gelatinized; hymenophoral trama regular, consisting of subparallel hyphae (3)-5-11 um broad; base of basidia and cheilocystidia not clamped. -- Covering layer: Epicutis of pileus consisting of a cutis which is yellowish in KOH, consisting of parallel hyphae 3.5-5 um broad, below this cutis less pigmented, subhyaline, rather irregularly interwoven, with many broad hyphae (5-15 um) intermixed. -- Growing singly on a city street, breaking through the asphalt. Material studied USA: Illinois, Evanston, 22 IX 1983, Singer N 5133 (F). This was compared with my complete notes on the type of *A brunnescens* from dump heaps at East Campbridge, Mass (FH) and Farlow's picture in Icones Farlowianae (1929), apparently referring to a topotype.

All descriptions (Peck's original diagnosis (1900) as well as Burt's description of the material depicted in Icones Falowianae) stress the fact that the context is unchanging in *A. brunnescens* whereas in *A. bisporus* it is always ± changing becoming pale pink to orangy salmon. My description above also suggests that there are differences in the color and covering of the pileus, the sequence of colors in the lamellae, and the presence of 4-spored basidia in the young carpophores as compared with *A. bisporus*. There remains some doubt about the identity of the European *A. vaporarius* (Pers. ex Vitt.) Moser. All European authors attribute to *A. vaporarius* (*A. villaticus* Brond. sensu Pilat) white context that turns pink or red and broad or coarse brown scales on the pileus, with the spores produced on tetrasporous basidia. Malloch (l.c.) discussed the possibility that *A. brunnescens*, *A. bisporus* and *A. vaporarius* may be considered "varieties" of a single species. This, obviously a "lumpers" attitude, may be defensible, but does not help in finding a correct name for the commercially cultivated mushroom which is neither *A. vaporarius* nor *A. brunnescens*, but (originally) the brown form of *A. bisporus*. To the best of our knowledge the white form is but a minor mutant of the latter. This white form, distinguished specifically by Pilat (1951) under the illegitimate (homonym!) name *A. hortensis* (Cooke) [Imai] might conceivably be called *A. bisporus* f. *albidus* (Lge.) but the taxonomical and nomenclatorial correctness of that combination as well as its necessity are subject to further study. It is by no means impossible that *A. brunnescens* has occasionally been cultivated in North America. Neither Malloch nor I have studied the material sent to Kauffman by Stewart (1929) and determined *A. brunnescens* (with some doubt) by the former, but recognized as *A. vaporarius* by A. H. Smith (1939). Thus, there is no proof that *A. brunnescens* Peck has indeed been under cultivation, inasmuch as Smith makes it quite clear that *A. vaporarius* in his sense is different from the type of *A. brunnescens*. *A. vaporarius* is said to have been grown occasionally in Europe.

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TAXONOMIC NOTES ON SOME POWDERY MILDEWS (IV)

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The present paper includes the following descriptions and combinations: *Typhulochaeta couchii* (Solheim & al.) U. Braun stat. nov., *Sphaerotheca crotonis* (Ponnappa) U. Braun comb. nov., and *Sph. aphanis* (Wallr.) U. Braun var. *physocarpi* U. Braun var. nov. Furthermore, notes about the *Uncinula* species on Sterculiaceae and Aceraceae are added.

1. *Typhulochaeta couchii* (Solheim, Eboh & McHenry) U. Braun stat. nov.

Bas.: *Typhulochaeta japonica* var. *couchii* Solheim & al., J. Elisha Mitchell Sci. Soc. 84(1), p.236 (1968).

I have reexamined original material of this interesting fungus, described on *Quercus arizonica* from Arizona. It is not closely related to *T. japonica*; both taxa are morphologically strongly distinct. Even the generic position of the Arizona fungus is not quite certain. *T. japonica* possesses very numerous clavate appendages (ca. 100-150), arranged in some circles in the upper half of the ascocarps (fig. 2). *T. couchii* is characterized by few appendages (ca. 5-30), irregularly scattered in the upper half of the fruitbodies. They are bristel-like, straight or somewhat curved, subcylindric or mostly decreasing from base to top, rarely subclavate, apex often somewhat enlarged, capped with an amber-coloured ellipsoid mass of waxy material. The peridium of the ascocarp is fairly thin, ca. 8-15 um, yellowish to brownish, semitransparent, revealing the asci and spores. Fig. 1.

Tai (1946) published the combination *Typhulochaeta koelreuteriae* (Miyake) Tai. Yu & Lai (1979) included this species in the genus *Typhulochaeta*, too; Zheng & Chen (1981), however, confined this genus to species with strictly clavate appendages and excluded *T. koelreuteriae*. Under these circumstances, it would be impossible to retain *T. couchii* in the genus *Typhulochaeta*; the introduction of a new genus would be necessary. But *T. japonica* and *T. couchii* are undoubtedly related and I prefer to modify the generic circumscription. The clavate shape of the apical appendages ("penicillate cells") is not sufficient as basic feature of *Typhulochaeta*. The special appendages of *T. japonica*, *alangii*, *couchii*, as well as *koelreuteriae* are able to gelify in water and to eject mucilaginous material. They are related with the penicillate cells of *Phyllactinia* and the capitate appendages of *Bulbouncinula*. These peculiarities refer the mentioned species to a single genus.

2. *Sphaerotheca crotonis* (Ponnappa) U. Braun comb. nov.

Bas.: *Kokkalera crotonis* Ponnappa, Sydowia *23*(1-6), p.5 "1969" (1970).

The species has been described from India on *Croton bonplandianus* Bail. (type IMI 134073, studied). The author introduced the new genus *Kokkalera* and stated that it deviates from *Sphaerotheca* by the absence of appendages. However, true very short, rudimentary appendages are present in the lower half of the fruitbodies. Strange to say the appendages are to be seen in the drawing of Ponnappa's original publication. Sparsely developed appendages are not unusual with *Sphaerotheca*. Hence K. *crotonis* pertains undoubtedly to *Sphaerotheca* and *Kokkalera* must be considered as a synonym of this genus. *Sph. crotonis*, well characterized by the scarcely developed appendages, should be recognized as a good species although the type material is very immature. The description of the conidial state in the original publication is a mystery to me. I reinvestigated the Oidium of the type and found conidia and conidiophores fully agreeing with *Sphaerotheca*: conidiophores long, 10-15 µm wide, followed by 1-3 short cells, conidia catenulate, ellipsoid-ovoid to doliform, 26-36 x 14-18 µm. Fig.3.

3. *Sphaerotheca aphanis* (Wallr.) U. Braun var. *physocarpi* U. Braun var. nov.

Syn.: *Sph. humuli* auct. p.p., *Sph. macularis* auct. p.p.

Cleistothecia gregaria, (55-) 60-85 (-90) µm diam., cellulae peridii irregulariter angulatae, ca. 6-25 µm diam., appendices saepe 1-10, mycelioideae, diametro cleistothecii 0.25-4plo longiores, septatae, tenuitunicatae, verruculosae, flavae - brunneae, 3-8 µm latae, ascus 60-80 x 50-70 µm, ascosporae (6-) 8, (16-) 20-25 (-28) µm. Fig.4.

Holotypus: hospes - *Physocarpus alternans* (Jones) Howell (= *Opulaster monogynus*), U.S.A., Boulder, Colo., 15-9-1909, Bethel, Barth., F. Columb. 3281 (NY).

Paratypus: hospes - *Physocarpus opulifolius* (L.) Maxim. U.S.A., Mazomanie, Wisc., Reed 432 (NY).

The race on *Physocarpus* is well distinguished from var. *aphanis* by the characteristic appearance of the infections: on inflorescences and leaves, amphigenous, the old, browned infected shoots, leaves and fruits from the previous season remain at the host plant and are covered by overwintered ascocarps; they are quite black with cleistothecia. The overwintered ascocarps contain mature asci with fully developed spores. It can be supposed that this variety has a special biology, maybe deviating from var. *aphanis*; but additional field observations or experiments are necessary. Furthermore, the fruitbodies possess only very few appendages, a feature which is unusual in *Sphaerotheca aphanis*.

4. *Uncinula* on Sterculiaceae

Two species of *Uncinula* are known on *Sterculia* and *Firmiana*:

(1) *Uncinula nishidana* Homma, J. Fac. Agric. Hokkaido Imp. Univ 38, p.367 (1937)

Syn.: *Erysiphe periyarensis* Ramakrishnan, Proc. Ind. Acad. Sci., B, 62(1), p.32 (1965). ? *Uncinula sterculiae* Yadav, Ind. Phytopath. 16, p.164 (1963).

Mycelium amphigenous, mostly epiphyllous, subpersistent. Cleistothecia gregarious, 80-125 µm in diam., cells polygonal, obscure, ca. 10-25 µm diam,, appendages equatorially inserted, stiff to flexuous, 6-20, straight to curved, often somewhat irregular, abruptly bent in the upper half, outline sometimes somewhat irregular, with slight constrictions or subnodulose-subundulate, about as long as the cleist. diam., width irregular, 5-11 µm, subequal throughout, rarely slightly increasing or decreasing towards the apex, occasionally somewhat enlarged at the very base (-15 µm), hyaline or brown at the base, 0-1 (-2)-septate, smooth, thin-walled, thicker below, often irregularly thicker, apex uncinate to circinate, not enlarged, loose to close, 3-5 asci, mostly without stalk, 40-65 x 30-50 µm, 4-5-spored, 18-25 x 11-16.5 µm. Fig.5,6.

I have reinvestigated the type material (ex SAPA). The species has been described on *Sterculia platanifolia* (= *Firmiana p*.). According to an information of Y. Nomura (Tokyo), it is only known in Japan from the type collection. I reexamined the types of *E. periyarensis* and *U. sterculiae* (ex IMI), both species described on *Sterculia* from India and basing on completely immature collections. I observed some ascocarps of *E. periyarensis* with appendages of a more developed stage and noticed that the apex is hooked when mature. Thus this species belongs undoubtedly to *Uncinula*. In some respects, Ramakrishnan's original description does not agree with the characteristics of the type. The cleistothecia are 90-110 µm in diam., appendages 10-20, asci about 4, 40-60 x 30-50 µm, spores 4-5, 18-25 x 11-16 µm. *E. periyarensis* coincides nicely with *U. nishidana* and must be considered a synonym. The type of *U. sterculiae* is also fully immature. The cleistothecia correspond well with *U. nishidana*. However, Yadav described the asci with 4-8 spores, a clear difference to *U. nishidana*. But I found only immature asci without spores, some of them, however, filled with oil drops. Maybe the oil drops have

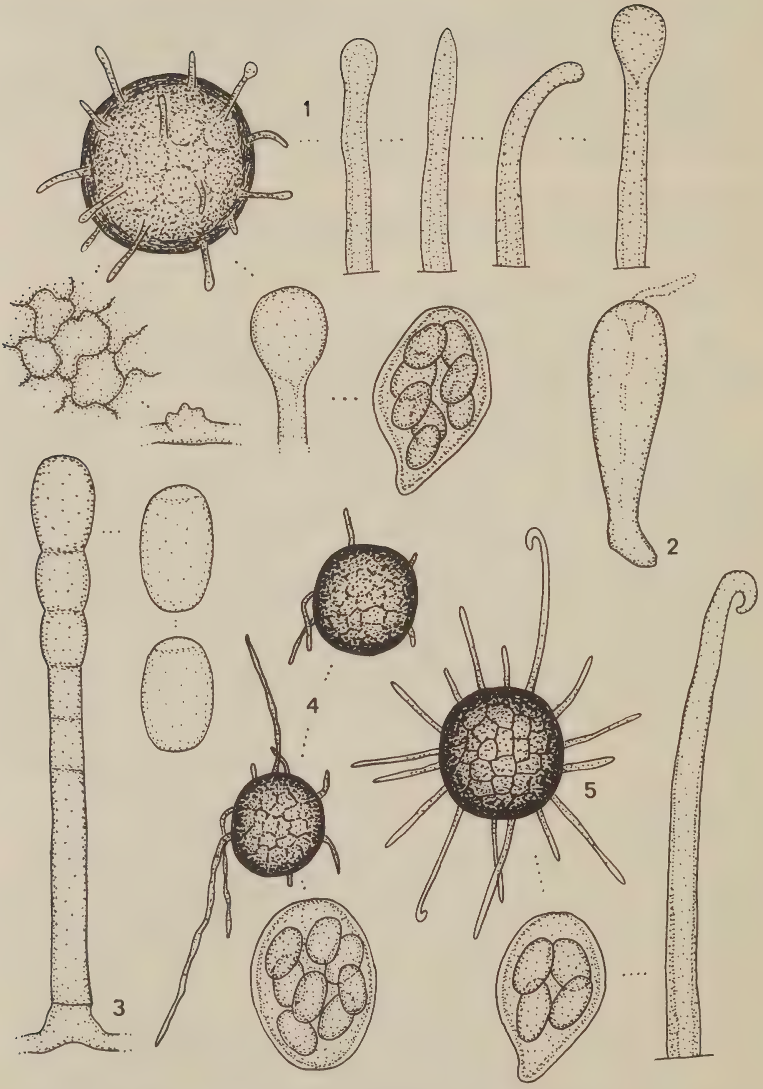

Fig. 1-5. *Typhulochaeta couchii* (1), ascocarp, ascus, appendages, head of an appendage, cells of the wall, appressorium. *T. japonica* (2), appendage. *Sphaerotheca crotonis* (3), conidiophore, conidia. *Sph. aphanis* var. *physocarpi* (4), ascocarps, ascus. "*Erysiphe periyarensis*"(5), ascocarp, ascus, appendage from the type.

been taken for spores. But the status of *U. sterculiae* is still unclear and the position as possible synonym of *U. nishidana* is only tentative.

(2) *Uncinula clintoniopsis* Zheng & Chen, Acta Microbiol. Sinica *17*(4), p.289 (1977)

Cleistothecia 80-120 (-145) µm in diam., 6-20 appendages, (0.75-) 1-1.5 (-1.75) x as long as the cleist. diam., asci 4-6 (-7), 50-75 x 35-60 µm, (3-) 4-6-spored, 18-25 x 9.5-18 µm.

The species differs from *U. nishidana* by appendages which are obviously thick-walled towards the base, stalk subequal throughout or mostly somewhat increasing upwards, (5-) 6-8.5 (-9) µm wide below, 6-10 (-11) µm wide above, apex closely circinate to subhelicoid, often somewhat enlarged. Fig. 7. This species has been described on *Firmiana simplex* from China. It occurs in Japan, too. I have studied the following material: ex herb. Nomura, on *F. simplex*, Japan, Shizuoka Pref., Ippeki-ko, Ito C., 19-10-1981, Nomura, YNMH 7984-2).

5. *Uncinula* on Aceraceae

Two species of *Uncinula* on *Acer* have been described, *U. ljubarskii* Golovin (on *A. pseudosieboldianum*, Far East of the U.S.S.R.) and *U. aduncoides* Zheng & Chen (on *A. oblongum* and *trifidum*, China). Zheng & Chen (1977) regarded *U. aduncoides* as a species morphologically distinct from *U. ljubarskii*. Nomura & Tanda (1983) recorded some *Uncinula* samples on *Acer palmatum* var. *palmatum* and var. *matsumurae*, *A. shirasawanum*, and *A. sieboldianum* from Japan and identified them with *U. aduncoides*.

I have had the opportunity to reinvestigate the holotype of *U. ljubarskii*, recently rediscovered in Leningrad (LE). Dr. S. Tanda and Y. Nomura (Tokyo) sent generously some of the Japanese collections. The comparison with the type of *U. ljubarskii* showed that the Japanese samples agree perfectly with this species, described from the Far East of the U.S.S.R. The Chinese collections are also very near to Golovin's species. The width of the appendages is only often somewhat increasing upwards. Maybe *U. aduncoides* must be considered as a special variety of *U. ljubarskii*. But the variability of the Chinese "forms" is still obscure; two collections are not sufficient to solve this problem. At any rate, the two species are conspecific. The following description bases on the type collection on *Acer pseudosieboldianum*:

Uncinula ljubarskii Golovin, Bot. mat. otd. spor. rast. *8*, p.92 (1952)

Syn.: *U. sinensis* auct. p.p. *U. aduncoides* Zheng & Chen, Acta Microbiol. Sinica *17*(3), p.192 (1977).

Mycelium amphigenous, mostly epiphyllous, thin patches or effused, sometimes confluent and covering the whole surface of the leaves, evanescent to subpersistent, conidia 22-27 x 12-16 (-18) µm. Cleistothecia 85-130 (-140)

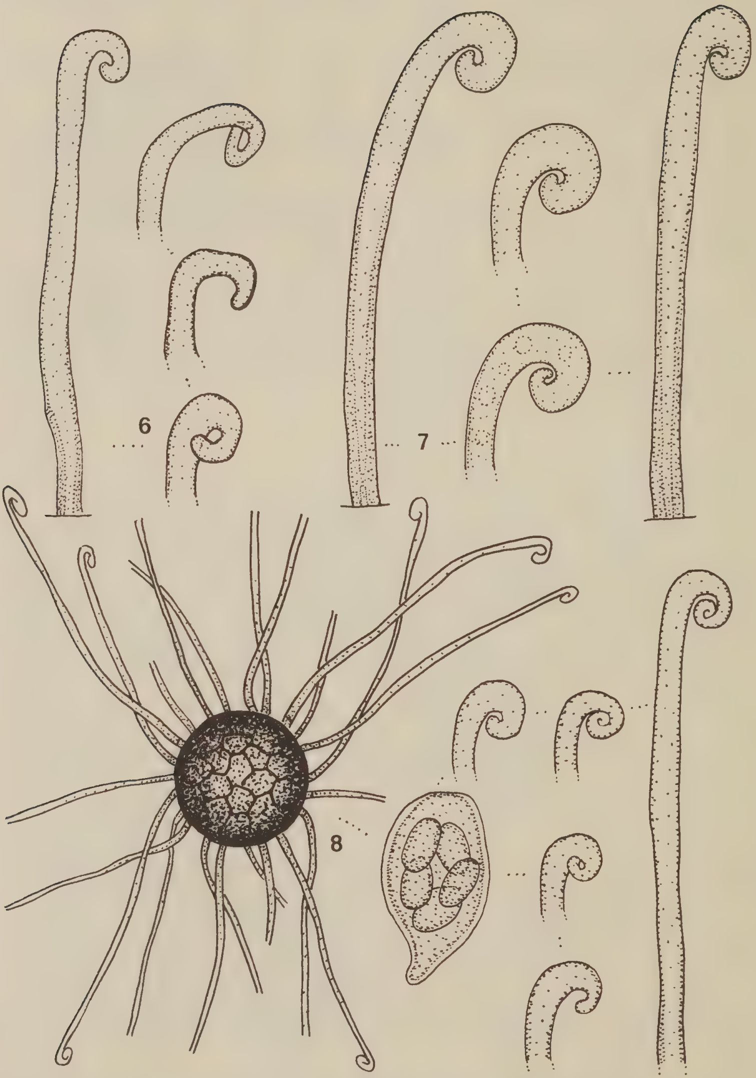

Fig. 6-8. *Uncinula nishidana* (6), appendage and circinate or uncinate apical parts from the type. *U. clintoniopsis* (7), appendages and apical parts from the Japanese collection. *U. ljubarskii* (8), ascocarp, ascus, appendage, apical parts from the type. U. Braun del.

µm in diam., cells obscure, polygonal, ca. 5-25 µm diam., appendages ± equatorially inserted, (10-) 20-40 (-45) per ascocarp, flexuous, curved, subgeniculate or subundulate, seldom straight, 1-2-, mostly 1.5-2 x as long as the cleist. diam., aseptate or with a single septum at the base, hyaline, sometimes coloured at the very base, thin-walled throughout or somewhat thicker below, smooth or rough in the lower half, width variable, subequal throughout or often somewhat increasing upwards, but circinate part usually not enlarged, some appendages increasing (1/2 - 2/3) and then narrowing towards the apex, apex closely circinate to subhelicoid, not enlarged, base ca. 4.5-8 µm wide, increased parts up to 11 µm wide, appendages often with collapsed segments, 5-16 asci, without or with short stalk, 40-65 x 25-45 µm, (4-) 5-6 (-7) spores, 16-25 x 10-15 µm. Fig. 8.

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DESCRIPTIONS OF NEW SPECIES AND COMBINATIONS IN MICROSPHAERA AND ERYSIPHE (VI)

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The present paper contains descriptions of the following new taxa: *Microsphaera thermopsidis* U. Braun spec. nov., *M. diffusa f. elongata* U. Braun f. nov., *Erysiphe californica* U. Braun spec. nov., *E. immersa* U. Braun spec. nov., *E. brunneopunctata* U. Braun spec. nov., *E. pseudosepulta* U. Braun spec. nov., *E. sparsa* U. Braun spec. nov., and *E. mayorii* var. *japonica* U. Braun & Y. Nomura var. nov. Furthermore, notes on some species of *Erysiphe* are added.

1. *Microsphaera thermopsidis* U. Braun spec. nov.

Syn.: *Trichocladia diffusa* f. *thermopsidis* Jacz. (1927, p.316). *Erysiphe communis* f. *thermopsidis* auct. p.p.

Mycelium amphigenum, evanescens vel subpersistens. Cleistothecia sparsa vel subgregaria, 80-140 µm diam., cellulae peridii angulatae, ca. 8-25 µm diam., appendices numerosae, ca. 10-40, irregulariter flexuosae, contextae, diametro cleistothecii 1-3 (-4) plo longiores, 0-1-septatae, ca. (4-) 6-9 (-10) µm latae, hyalinae, verruculosae, tenuitunicatae et ad basim crassitunicatae, vel moderatim crassitunicatae, simplices vel ad apicem irregulariter dichotome ramosae (1-5x), non recurvatae, asci 6-14, 40-80 x 25-45 µm, ascosporae 2-4 (-5), 16-26.5 x 10-16 µm. Fig. 1.

Holotypus: hospes - *Thermopsis lanceolata* R. Br., U.S.S.R., Zabajkal´skaja obl., selo Preobratepskoe, v 35 km ot g. Troščkosavska, lug, 10-7-1914, Michno (LE).

The appendages are inserted around the equatorial zone, the shape is extremely irregular, flexuous, strongly undulate-geniculate, often strongly curved to nearly irregularly helicoid, the branchings are very diffuse, the tips are not recurved.

The new species is closely allied to *M. hedysari* U. Braun (appendages narrower, ca. 3.5-6.5 µm wide, strongly verrucose, tips of the ultimate branchlets frequently recurved, asci usually 4-6-sp.) and *M. alhagi* (Golovin) U. Braun (mycelium dense, persistent, causing deformations and defoliations, ascocarps mostly larger, asci 4-6-sp.). The relation to *Erysiphe thermopsidis* Zheng & Chen is still obscure. It could be supposed that this species bases on immature material, but there are some additional differences. The appendages of the latter species are thin-walled throughout and inserted in the lower half of the ascocarp.

2. *Microsphaera diffusa* C. & P. f. *elongata* U. Braun f. nov.

Appendices flexuosae, diametro cleistothecii 2-4.5 plo longiores.

Holotypus: hospes - *Psoralea physodes* Dougl., U.S.A., Bremerton, Wash., 15-8-1912, Bartholomew (FH).

The appendages of f. *diffusa* are usually shorter and fairly stiff (1-3, mostly 1.5-2.5 x as long as the cleist. diam.). The typical form occurs in N. America on hosts of the following genera: *Apios*, *Cassia*, *Desmodium*, *Dolichos*, *Glycine*, *Glycyrrhiza*, *Lespedeza*, *Phaseolus*, *Strophostyles*. Collections on *Meibomia* and *Psoralea* (*f. elongata*) possess very long, flexuous appendages. Furthermore, I have studied a single sample on *Robinia pseudacacia* well agreeing with f. *elongata* (U.S.A., Durham, N. Carol., 1937, Wolf, FH). The taxonomic value of this feature is not quite certain. Therefore, I prefer to describe this race only as forma.

3. *Erysiphe californica* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium cauligenum et amphigenum, subpersistens, conidia catenulata, ellipsoideae (-ovoideae) vel doliiformae, 25-40 x 14-22.5 µm. Cleistothecia sparsa vel gregaria, 100-150 (-185) µm diam., cellulae peridii 8-25 µm diam., appendices mycelioideae, diametro cleistothecii ca. 0.25-1plo longiores, hyalinae, tenuitunicatae, septatae, ca. (2.5-) 3.5-7.5 µm latae, asci ca. 10-25 (-35), 50-90 x 20-35 µm, ascosporae 2 (-3), (15-) 18-25 (-28) x (10-) 11-17 µm. Fig. 2.

Holotypus: hospes - *Eriogonum blissianum* Mason., U.S.A., Berkeley, Alameda Co., 13-9-1944, Bonar, California fungi 630 (CUP).

Paratypi: hospes - *Eriogonum giganteum* Wats., l.c., California fungi 631 (CUP). *E. marifolium* T. & G., Mycobionta of Mt. Shasta, near the Sisson S. Trail, just below Horse Camp, 26-7-1939, Cooke (FH).

The mycelium forms dense, white patches, cleistothecia immersed in the tomentum of the leaves or stems, appendages few to numerous, in the lower half, mostly sparsely developed, often rudimentary, smooth to rough, septa

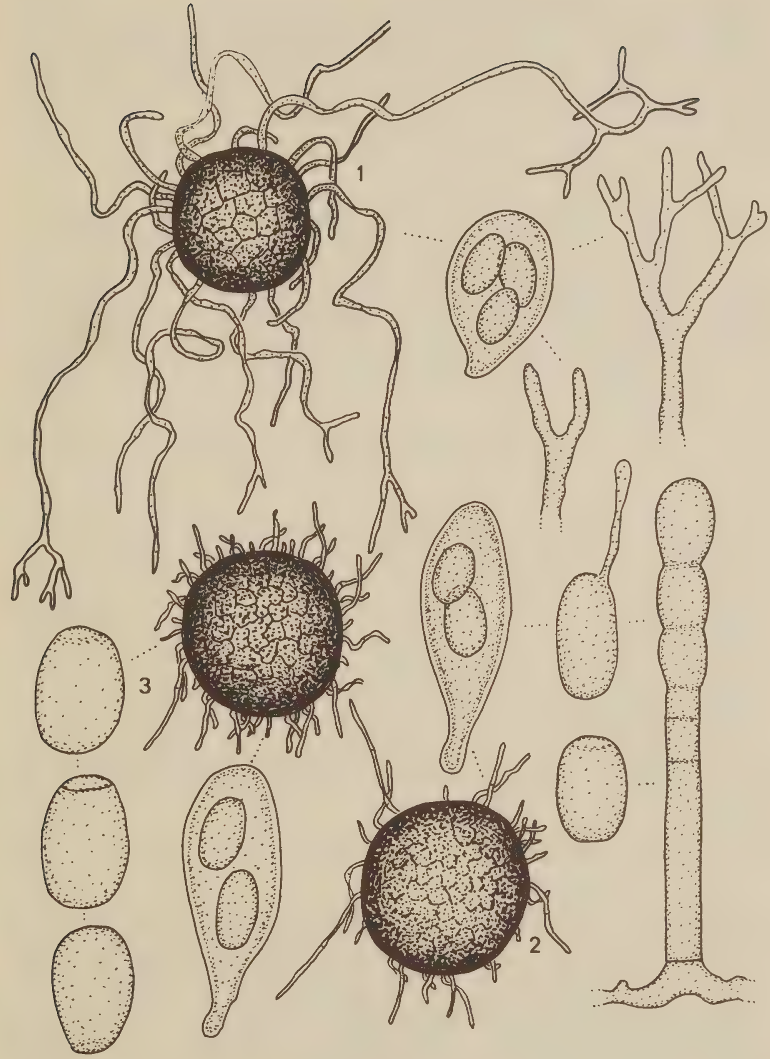

Fig. 1-3. Microsphaera thermopsidis (1), ascocarp, ascus, two apical branchings. Erysiphe californica (2), ascocarp, ascus, conidiophore, conidia. E. immersa (3), ascocarp, ascus, conidia. U. Braun del.

rather inconspicuous.

The new species is well distinguished from the *E. cichoracearum* complex by large ascocarps with narrow, hyaline, very short, often rudimentary appendages. The cleistothecia are reminiscent of *E. verbasci*, a species with quite a distinct conidial state.

4. *Erysiphe immersa* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium amphigenum, subpersistens, conidia catenulata, ellipsoideae-ovoideae vel doliiformae, 24-40 x 15-24 µm. Cleistothecia sparsa vel subgregaria, 95-165 µm diam., saepe 120-150 µm, cellulae peridii ca. 10-25 µm diam., appendices numerosae, contextae et cum mycelio intertextae, diametro cleistothecii ca. 0.25-1plo longiores, mycelioideae, hyalinae, septatae, 3.5-9 µm latae, asci ca. 10-25, 60-90 x 25-40 µm, ascosporae 2, 19-26.5 x 12-18 µm. Fig. 3.

Holotypus: hospes - *Eremocarpus setigerus* (Hook.) Benth., U.S.A., Plants of California, Coal Mine Ridge, Santa Cruz Mt., 30-10-1905, Dudley (BPI).

The mycelium is effused or forms patches, the conidiophores are very long, observed fragments up to 300 µm long, some foot-cells 50-80 µm long, followed by a second cell of about the same length or longer. The conidia are ellipsoid to doliform, l/w (1.1-) 1.3-2. The ascocarps are immersed in the dense tomentum of the leaves, appendages often very short, hyaline or only very faintly coloured, smooth or somewhat rough.

On account of the conidial stage, this species belongs to *Erysiphe* sect. *Golovinomyces* subsect. *Depressa* (conidiophores very long, increasing from base to top). It differs from *E. depressa* and *verbasci* by the structure of the conidiophores and from *E. echinopis* by smaller asci and spores.

5. *Erysiphe brunneopunctata* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium amphigenum, persistens, hyphae brunneae, conidia catenulata, ellipsoideae-doliiformae, ca. 28-38 x 13.5-19 µm. Cleistothecia sparsa vel subgregaria, 90-135 µm diam., cellulae peridii irregulariter angulatae, 10-25 (-30) µm diam., appendices numerosae, mycelioideae, diametro cleistothecii 0.5-2.5plo longiores, contextae et cum mycelio intertextae, brunneae, septatae, tenuitunicatae, 5-14.5 µm latae, saepe 6-10 µm, asci 8-15, (50-) 60-80 (-95) x 25-40 µm, ascosporae 2-4, 18-32 x 11-18 µm. Fig. 4.

Holotypus: hospes - *Mimulus guttatus* DC., U.S.A., California, Amador Co., Eldorado Nat. Forest, 22-9-1954, Quick, California fungi 1025 (FH).

The persistent mycelium turns to brown, hyphae rather coarse, ca. 5-10.5 µm wide, thin-walled, sometimes moderately thick, separation between appendages and persistent hyphae difficult, they form a brown felt around the fruit-bodies. The ascocarps are scattered and the host leaves appear dotted.

The new species is characterized by the well developed persistent mycelium, scattered cleistothecia, appendages which are inserted from the basal to the upper half, and 2-4-spored asci.

6. *Erysiphe pseudosepulta* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium cauligenum et amphigenum, persistens, dense tomentosum, conidia catenulata, cylindraceae-doliiformae (-ovoideae), ca. 20-32 x 10-15 µm. Cleistothecia gregaria, 85-175 µm diam., saepe 90-155 µm, cellulae peridii ca. 8-20 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii ca. 0.25-2plo longiores, contextae et cum mycelio intertextae, hyalinae, septatae, tenuitunicatae, ca. 3-6.5 µm latae, asci 10-35, saepe 10-25, (45-) 50-75 (-90) x (20-) 25-35 (-40) µm, ascosporae 2 (-3), 16-32 x 8-16 µm. Fig. 5.

Holotypus: hospes - *Chrysothamnus viscidiflorus* Nutt., U.S.A., Utah, Rich Co., near Leo Reservoir, Cache Nat. Forest, Old Canyon, west of Randolph, 4-9-1971, Rogerson (FH). Isotypus: NY.

Paratypi: hospes - *Chrysothamnus vaseyi* (Gray) Greene, U.S.A., N. Mexico, Stinking Lake, 21-8-1911, Standley (FH). *Chrysothamnus linifolius* Greene, U.S.A., N. Mexico, Shiprock, 12-8-1911, Standley (FH). *Chrysothamnus parryi* U.S.A., Wyoming, Centenial, Albany Co., 7-8-1900, Nelson, Plants of Wyoming 7999 (FH).

The mycelium is dense, persistent, often pannose, patches or effused, often covering the whole surface of the leaves, appressoria nipple-shaped. The ascocarps are immersed in the dense mycelium, the appendages are often very short, differentiation between appendages and hyphae difficult.

The new species pertains to *Erysiphe* sect. *Golovinomyces*. It differs from the *E. cichoracearum* complex by the features (appearance) of the mycelium and ascocarps, which remind of *E. sepulta* Ell. & Ev., a species on the same host genus, but belonging to sect. *Erysiphe*.

A collection on *Grindelia squarrosa* (Pursh.) Dunal (U.S.A., Utah, Salt Lake City, 28-7-1936, Darker, FH) agrees well with the present fungus (cleist. 120-200 µm diam.) and should be included. Other collections on the same host pertain clearly to *E. cichoracearum*.

7. *Erysiphe sparsa* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium amphigenum, saepe epiphyllum, evanescens, conidia catenulata, ellipsoideae-ovoideae vel doliiformae-

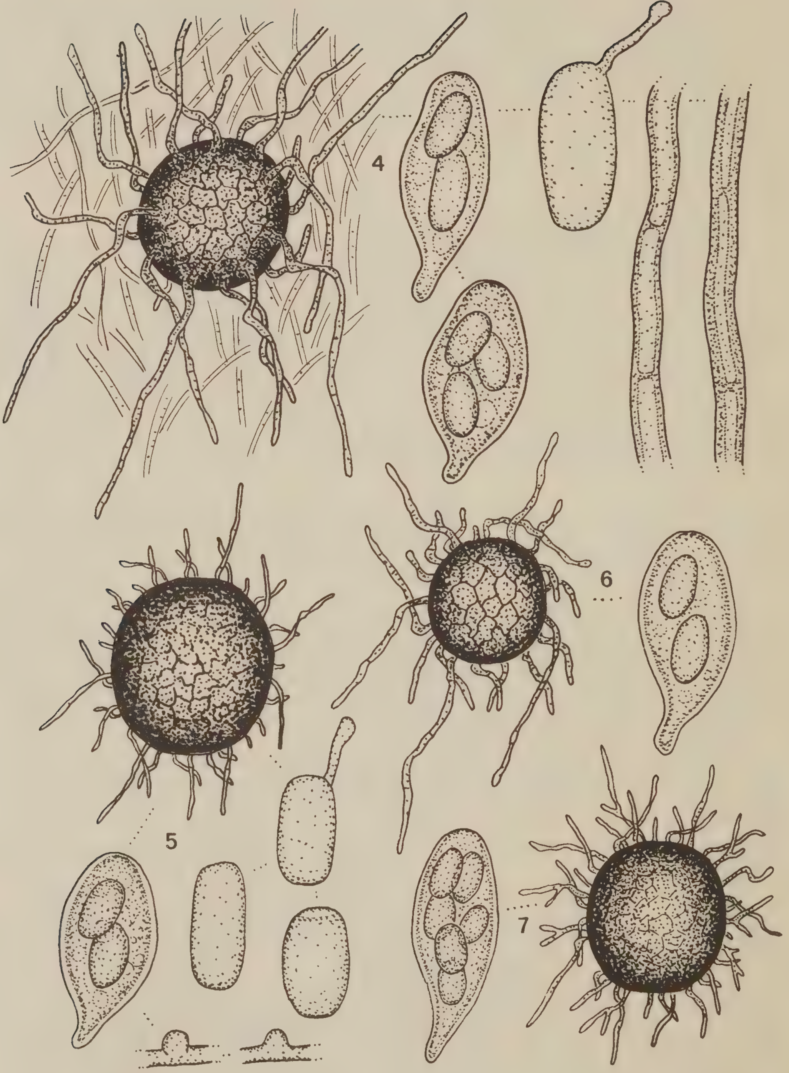

Fig. 4-7. *Erysiphe brunneopunctata* (4), ascocarp, asci, conidium with germ tube, two hyphae of the persistent mycelium. *E. pseudosepulta* (5), ascocarp, ascus, conidia, appressoria. *E. sparsa* (6), ascocarp, ascus. *E. mayorii* var. *japonica* (7), ascocarp, ascus. U. Braun del.

subcylindraceae, ca. 25-40 x 14-20 µm. Cleistothecia sparsa, 90-130 µm diam., cellulae peridii ca. 8-25 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii 0.5-1.5plo longiores, contextae, 4-11 µm latae, tenuitunicatae, septatae, flavae vel brunneae, asci 8-15, 60-80 x (25-) 30-40 µm, ascosporae 2, 20-30 x 10-17 µm. Fig. 6.

Holotypus: hospes - *Acalypha virginica* L., U.S.A., Wisc., Madison, Dane Co., 17-10-1944, Greene (FH). Isotypus: BPI.

The species belongs to sect. *Golovinomyces*. It is very near to *E. greeneana* U. Braun (on *Parietaria*, Urticaceae), well characterized and distinguished from the *E. cichoracearum* complex by sparsely developed, evanescent mycelium and scattered ascocarps.

8. *Erysiphe mayorii* Blumer var. *japonica* U. Braun & Y. Nomura var. nov.

Cleistothecia similia eis typi; ascosporae 4-7, saepe 5-6.

Holotypus: hospes - *Cirsium nipponicum* (Maxim.) Makino, Japan, Yamanashi Pref., Katsunuma T., Higashi-yamanashi-gun, 28-10-1980, Nomura, YNMH 5602-2 (HAL). Isotypus: herb. Nomura.

E. mayorii is distributed in Europe and Asia (Japan). It is composed of three races, var. *mayorii* on Cirsium (confined to Europe, asci 6-8-, frequently 8-spored), var. *cicerbitae* U. Braun (endemic in European high mountains, asci 4-7-, mostly 5-6-spored), and var. *japonica* (confined to Asia, Japan, asci 4-7-, mostly 5-6-spored). The Japanese race (on Cirsium) should not be lumped with the European var. *cicerbitae* (on *Cicerbita*); both varieties are geographically clearly separated and occur on different host genera. Fig. 7.

9. Notes on some species of *Erysiphe*

a. *Erysiphe cumminsiana* U. Braun occurs in N. America on *Heliopsis scabra* Dunal, too (studied mat.: Boulder, Colo., 21-8-1930, Bartholomew; and White Mts., N. Mexico, 15-8-1897, Wooton, FH). The *Heliopsis* material coincides exactly with the type on *Senecio seemannii* (conidia catenulate, appressoria lobed, asci without spores in collections of the current year).

b. *Erysiphe cichoracearum* DC. var. *latispora* U. Braun occurs in N. America beside *Helianthus* and *Rudbeckia* also on host species of *Ambrosia* and *Iva* (studies mat.: some collections from AZ and FH).

c. *Erysiphe depressa* (Wallr.) Schlecht. occurs in N. America, beside *Arctium*, also on *Franseria ambrosioides* (studied mat.: Arizona, Pima Co., Santa Catalina Mts., 29-3-1969, Gilbertson, AZ). The characteristic conidial state on this host agrees well with *E. depressa* (conidiophores very long, up to 250 µm, foot-cells ca. 100-140 µm, width increasing from base to top, conidia 29-42.5 x 20-28.5 µm, l/w 1.2-1.7).

d. The status of *Erysiphe euphorbiae* Peck

Salmon (1900) regarded this fungus as identical with *Microsphaera euphorbiae* B. & C. He noted that he had not seen an authentic specimen of *E. euphorbiae*. He changed the name of the *Microsphaera* species to *M. euphorbiae* (Peck) B. & C. and all subsequent authors followed Salmon. The revision of the holotype of *E. euphorbiae* Peck (on *E. hypericifolia*, U.S.A., N. Greenbush, Peck, NYS) revealed, however, that this species clearly pertains to the genus *Erysiphe*. It differs from immature samples of *M. euphorbiae* by coloured, septate appendages which are thin-walled throughout. *M. euphorbiae* Berk. & Curt., Grevillea 4, p.160 (1876) is the correct quotation of the *Microsphaera* species. The *Erysiphe* is characterized as follows:

Erysiphe euphorbiae Peck, Rep. N.Y. Stat. Mus. 26, p. 80 (1874)

Amphigenous, mycelium effused, evanescent (-subpersistent), cleistothecia scattered (-subgregarious), mostly hypophyllous, 65-100 µm in diam., cells obscure, irregularly polygonal to rounded, ca. 8-20 µm diam., appendages equatorially inserted or in the lower half, few to numerous, ca. 4-25, simple, long, about 1-6 x as long as the cleist. diam., mycelium-like, flexuous - contorted, rather stiff below, coarse, ca. 4-9 µm wide, septate throughout, smooth to rough, brown throughout when mature, very long appendages sometimes paler or hyaline above, 3-5 asci, without or with short stalk, 35-65 x 25-45 µm, 3-4-spored, 16-24 x 10-15 µm. Fig. 8.

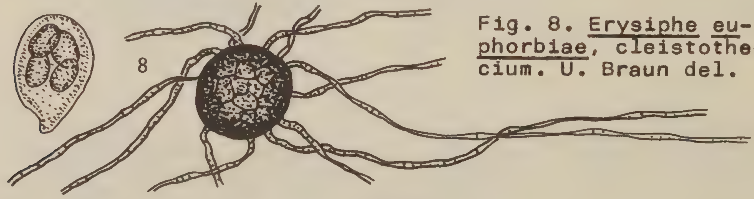

Fig. 8. *Erysiphe euphorbiae*, cleistothecium. U. Braun del.

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SAGENOMA RYUKYUENSIS, A NEW THERMOTOLERANT ASCOMYCETE

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In a study of soil-borne Ascomycetes, loose clusters of reddish, *Talaromyces*-like ascocarps were observed on the dilution plate of partially sterilized soil samples from the Okinawa Prefecture, southwestern Japan. These ascocarps, on further study, were found to associate with a *Sagenomella* anamorph. We assigned this fungus to the monotypic genus *Sagenoma* Stolk & Orr (1974), a member of the Trichocomaceae having a *Sagenomella* anamorph. After comparison with the typical strain (CBS 114.72) of *S. viride* Stolk & Orr, deposited in the Centraalbureau voor Schimmelcultures, it is described here as the second species of *Sagenoma*. The specimen studied is preserved at the Mycological Herbarium, National Institute of Hygienic Sciences, Tokyo (NHL). The living culture has been placed in the American Type Culture Collection.

Sagenoma ryukyuensis Ueda & Udagawa, sp.nov. (Fig. 1)
Stat. Anam. *Sagenomella ryukyuensis* Ueda & Udagawa, anam. sp.nov.

Coloniae in agaro farina avenae mixto effusae, intra 10 dies in 37°C 8.5 cm diam, planae, e strato tenui ascocarparum superficialis granulatorum constitutae, corallinae vel atrovinosae; conidia limitata, in parte V-formi concentricta, atroherbacea; exsudatum nullum; odor leviter mucidus; reversum melleum vel corallinum.

Ascocarpae superficiales, discretae vel confluentes, profunde rubentes, globosae vel subglobosae, 80-350 µm diam, 14-21 diebus maturescentes; involucrum rubens, compactum, e hyphis intricatis 2-3.8(-5) µm diam compositum, maturitate aliquanto pseudoparenchymatum, e cellulis irregularibus 3-10 µm diam compositum. Asci irregulariter dispositi, cate-

nati in ascogonicis hyphis, octospori, globosi vel subglobosi, 8.5-10.5 µm diam, evanescentes. Ascosporae flavo-aurantiacae, late ellipsoideae, 4-5 x 3-4 µm, crassitunicatae, plerumque spinulosae.

Mycelium e hyphis hyalinis vel dilute brunneis, ramosis, septatis, plerumque levibus, 1.5-3 µm diam compositum. Conidiophora mononemata, erecta, brevia, 12.5-50 x 3-4 µm, dilute brunnea, levia, septata, irregulariter ramosa vel penicillos terminalia formantia; verticilli e 3-4(-6) phialidibus constantes. Phialides interdum simplices, cylindricae vel lageniformes, 10-17.5(-20) x 2.5-5 µm, gradatim attenuatae. Conidia primum hyalina, deinde dilute virentia, in longis catenis (ad 500 µm) divergentibus connexa, cylindrica, fusiformia, ellipsoidea vel ovoidea, 3.5-12 (-15) x 2.5-3.5 µm, crassitunicata, levia vel saepe scabra, utrinque connectivo terminata.

Temperatura optima 30-37°C.

Holotypus: cultura NHL 2917 ex solo, Okinawa in Japonia, in 1979.vi a S. Ueda, isolata. In collectione fungorum 'National Institute of Hygienic Sciences (NHL), Tokyo, Japan'.

Etymology: lat. *ryukyuensis*, referring to the Ryukyu Islands, Okinawa, Japan, the type locality.

Colonies on oatmeal agar spreading rapidly at 37°C, attaining a diameter of 8.5 cm within 10 days, plain, consisting of a thin layer of numerous ascocarps, produced adjacent to the agar surface, appearing granular and Coral to Dark Vinaceous (Rayner, 1970) in color; conidia limited, more or less concentrated in localized V-shaped sectors, Dark Herbage Green (Rayner, 1970); exudate lacking; odor faintly moldy; reverse Amber to Coral (Rayner, 1970).

Ascocarps superficial, discrete to confluent, ripening within 2 to 3 weeks, deep reddish, globose to subglobose, 80-350 µm in diam, sometimes depressed above, covered by a rather thick wall composed of many layers of closely packed hyphae measuring 2-3.8(-5) µm wide, becoming pseudoparenchymatous at maturity; peridium reddish, textura intricata, composed of irregular cells measuring 3-10 µm in diam. Asci irregularly disposed in curved chains, 8-spored, globose to subglobose, 8.5-10.5 µm in diam, evanescent at maturity. Ascospores yellowish orange, reddish in mass, broadly ellipsoidal, 4-5 x 3-4 µm, thick-walled, usually spinulose with spines about 0.5 µm long. Ascocarp initials consisting of swollen branches or intercalary portions of aerial hyphae, which become septate and coiled.

Mycelium composed of hyaline to pale brown, branched,

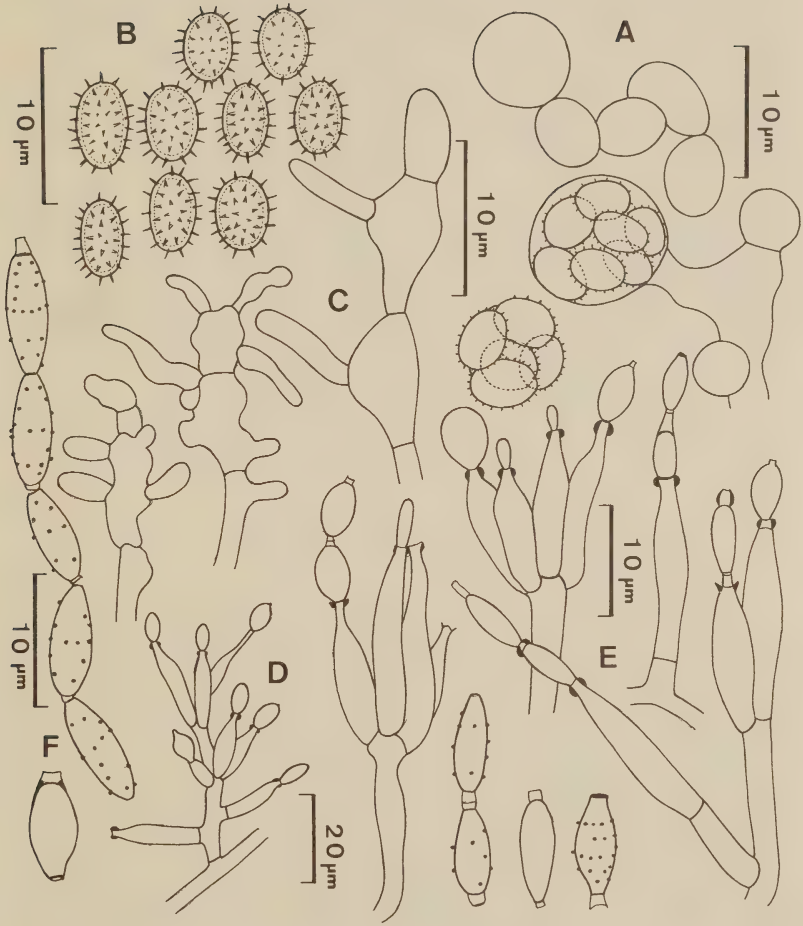

Fig. 1. *Sagenoma ryukyuensis*, NHL 2917. A. Asci. B. Ascospores. C. Ascocarp initials. D. & E. Conidiogenous structures. F. Conidia.

septate, commonly smooth-walled, 1.5-3 µm wide hyphae. Conidiophores mononematous, erect, short, 12.5-50 x 3-4 µm, pale brown, smooth-walled, septate, bearing solitary phialides or in groups of 3-4(-6) without metulae, or divergently branched with irregular whorls of phialides, rarely terminating in biverticillate penicilli. Phialides cylindric or lageniform, 10-17.5(-20) x 2.5-5 μm, tapering toward the narrow tip. Conidia at first hyaline, becoming pale green, grayish yellow-green in mass, formed in long, divergent chains up to 500 μm long, cylindric, fusiform, ellipsoid or ovoid, 3.5-12(-15) x 2.5-3.5 μm, thick-walled, smooth or often roughened, somewhat spirally banded, provided with distinct connectives at both ends.

Colonies on malt agar spreading, 7.8 cm in 14 days at 37°C, thin, with reduced formation of ascocarps, showing a marked tendency to develop sectors; conidia abundantly produced, Saffron to Yellow-green or Malachite Green (Rayner, 1970); reverse Pale Luteous to Malachite Green (Rayner, 1970). Colonies on Czapek agar growing restrictedly, very thin, vegetative mycelium submerged, Pale Luteous (Rayner, 1970); ascocarps not produced.

Thermotolerant: The optimal temperature for growth and sporulation (teleomorph and anamorph) is 30-37°C, half optimal growth and somewhat reduced sporulation occur at 25°C and 40°C, and no growth occurs at 45°C. At 20°C, growth and sporulation are strongly reduced.

Specimen examined: ex soil, Naha-City, Okinawa-Pref., Japan, June 1979, coll. S. Kiyoto, isolated by S. Ueda, No. 2917, NHL (Holotype).

The assignment of this fungus to the genus *Sagenoma* Stolk & Orr (1974) is based upon three primary considerations: (1) ascocarps are highly pigmented, globose to subglobose, soft and hyphal in texture, (2) asci are formed in chains and (3) associated anamorph belongs to the genus *Sagenomella* W. Gams (1978). As shown in Table 1, *Sagenoma viride* Stolk & Orr, the type species of the genus, differs from the new species in producing dark green ascocarps, smaller asci, yellow-green, ellipsoidal ascospores with walls finely striate, and more simple conidiogenous structure. Conidia in the new fungus are large and usually roughened, while *S. viride* has smaller and smooth-walled ones. The complexly branched conidiophores of *S. ryukyuensis* resembles *Sagenomella verticillata* W. Gams & Söderström (Gams, 1978); the conidia of the latter are, however, smooth-walled or very finely encrusted and smaller (3.5-4 x 1.5-2.2 μm).

The conidiogenesis of *Sagenomella* is characterized by formation of 'connected' conidial chains and frequent occurrence of reduced, irregularly swollen or sympodially proliferating phialides (Gams, 1978). The terms 'connected' and 'disconnected', used by Gams to describe chains of conidia in the paper on *Sagenomella*, were later evaluated by Minter et al. (1983) and compared with Subramanian's terminology

Table 1. Comparative morphology of *Sagenoma ryukyuensis* and *S. viride* Stolk & Orr

	S. ryukyuensis	*S. viride*
Colony	Rapidly developing Coral-Dark Vinaceous + Dark Herbage Green	Slowly developing Dark green
Ascocarps	Deep reddish	Dark green
Peridium	Closely interwoven hyphae; not appendaged	Loosely interwoven hyphae; appendaged
Asci	Globose, 8.5-10 µm diam, in chain	Globose, 7.5-8 µm diam, in chain
Ascospores	Yellow-orange, 4-5 x 3-4 µm, spinulose	Yellow-green, 3.7-4.5 x 2.5-3 µm, finely spinulose
Anamorph	*Sagenomella*	*Sagenomella*
Conidia	3.5-15 x 2.5-3.5 µm, smooth or rough	2.5-4 x 1.5-2 µm, smooth
Opt. temp. for growth	30-37°C	30°C

for phialoconidia ('true' and 'false'). They concluded that "there are at least three categories of chains described (A: true chain of conidia with connective joining upper conidia, B: false chain of conidia with no connective, and C: false chain of conidia with connective joining upper conidia), and since there are only two sets of terms, each containing two words, it is obvious that one set alone will not be enough to describe the three categories ......". Thus *Sagenomella* species produce true chains of conidia with connectives. This mode of the conidiogenesis is shown as the presence of a new inner wall like wall-building ring in true-chain phialides. The feature in the phialides of *S. ryukyuensis* has been easily seen using interference contrast microscopy.

This fungus becomes the third species of cleistothecial Ascomycetes known to produce a *Sagenomella* anamorph, because *Thielavia emodensis* Udagawa & Y. Sugiyama (1982) which has black, non-ostiolate ascocarps and a *Sagenomella* anamorph was recently described from Nepalese soil.

ACKNOWLEDGMENT

Appreciation is expressed to Professor D. Malloch of the University of Toronto for reviewing the manuscript.

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A NEW SPECIES OF HALOSARPHEIA (ASCOMYCETES) FROM WOOD SUBMERGED IN FRESHWATER

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ABSTRACT

A new species of Halosarpheia from wood submerged in a freshwater river is described and illustrated.

INTRODUCTION

The genus Halosarpheia was established by Kohlmeyer and Kohlmeyer (1977) to accommodate a single species, H. fibrosa J. Kohlm. & E. Kohlm. This species was characterized by its tightly coiled polar appendages which unwound in water to form extremely long, thin filaments. Shearer and Crane (1980) amended the genus, described two additional species, and transferred three existing species to Halosarpheia. Halosarpheia bentonensis Koch was described in 1982 (Koch, 1982) and Halosphaeria trullifera (Kohlm.) Kohlm., [Remispora trullifera Kohlm.] was transferred to Halosarpheia by Jones, et al. (1983). A fungus (CS-667-1), belonging in Halosarpheia, was found on submerged wood collected from the Wisconsin River in Wisconsin. Since this fungus differs from all species in Halosarpheia, it is described here as a new species.

TAXONOMIC PART

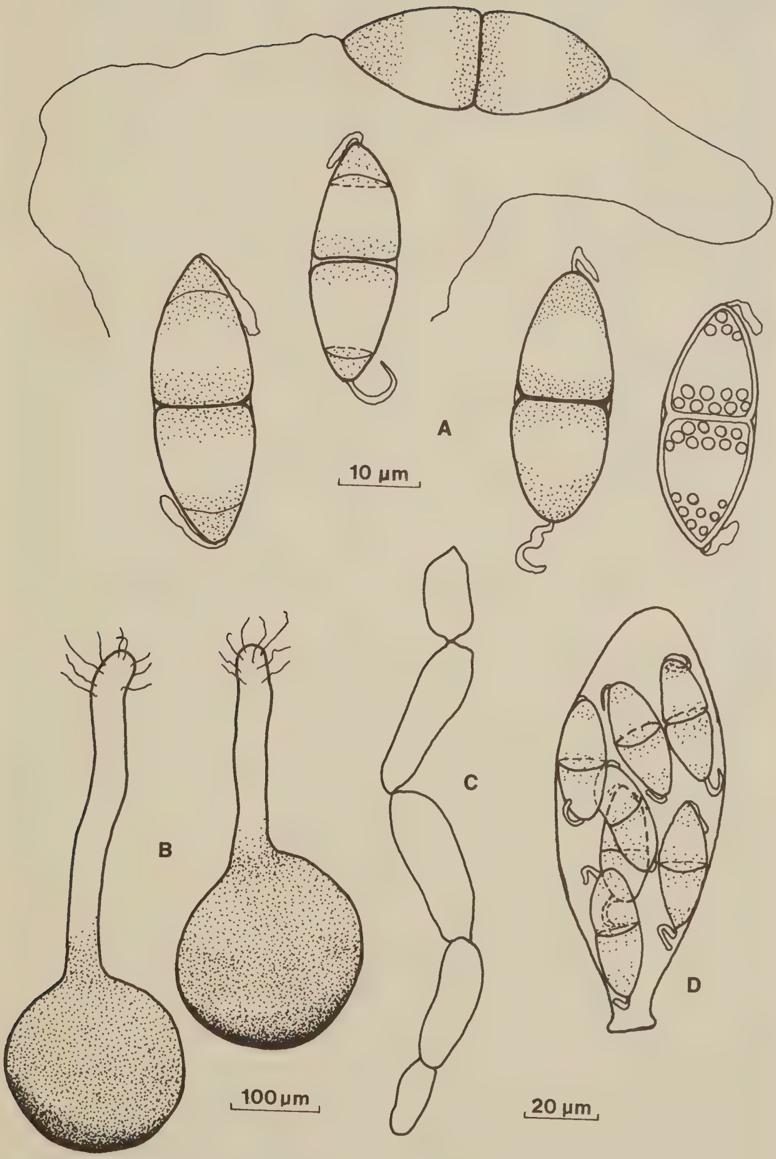
Halosarpheia lotica sp. nov. Figs. 1 - 10

Coloniae in agaro Emersonii cum extracto fermenti atque amylo solubili composito crescentes floccosae, primum albae, deinde canescentes, demum griseo-nigrae. Mycelium e hyphis ramosis, septatis, subhyalinis vel griseo-brunneis compositum; hyphae aereae hyalinae. Ascocarpi in substratis nativis crescentes singulares vel aggregati, superficiales vel immersi, hyalini, vel griseo-brunnei, ostiolati, ventri globoso vel subgloboso, 208-396 ($\bar{x}$=352, s=62) µm diametro. Collum elongatum, periphysatum, ad apicem vel prorsus hyalinum, 238-693 ($\bar{x}$=336, s=152) x 30-48 ($\bar{x}$=39, s=4.9) µm. Peridium tenue, membranaceum, e cellulis pseudoparenchymaticis compositum. Centrum ex ascis ad perithecii basim ortis et cellularum magnarum tenuiter tunicatarum catenulis (catenophysibus) circumdatis consistens. Asci apparatu apicali carentes, clavati vel cylindrici, unitunicati,tenuiter tunicati, ante ascosporarum maturitatem vel maturitate deliquescentes, 86-137 ($\bar{x}$=115, s=12) x 34-43 ($\bar{x}$=39, s=2.7) µm. Ascosporae appendiculatae, ellipsoidales, hyalinae, 1- vel maturiores 3- septatae, ad septa media paulum constrictae, circum septum et ad extrema amba guttulis olearis conspicuis notatae, 26.4-38.4 ($\bar{x}$=31.9, s=2.9) x 9.6-14.4 ($\bar{x}$=12, s=1.2) µm. Ascosporarum appendiculae bipolares, facie nonnihil ab axe affixae, extensae 7-17 x 1.5 - 2.4 µm, e filamento unico arete spirali, elatere aspectu hamato, appressione ad tunicam in formam clypei applanato, in aquo resoluto in filamentum perquam longum, tenue consistente.

Holotypus: in ligno submerso e flumine Wisconsin, prope oppidum Wisconsin Dells, republicae Wisconsin, U.S.A., die 4 m. Octobris 1981 a C. A. Shearer lectus, sub numero CS-667-1 in herbario NY conservatus.

Colonies on Emerson's yeast extract soluble starch agar floccose, white becoming grey to greyish black. Mycelium composed of branched, septate, subhyaline to greyish brown hyphae; aerial hyphae hyaline. Ascocarps on natural substrata solitary to gregarious, superficial to immersed; ostiolate, hyaline to greyish brown; venter globose to subglobose, 208-396 ($\bar{x}$=352, s=62) µm diam; neck elongated, periphysate, hyaline at apex or throughout, 238-693 ($\bar{x}$=336; s=152) x 30-48 ($\bar{x}$=39, s=4.9) µm. Peridium thin, membranous, composed of pseudoparenchymatic cells. Centrum consisting of asci arising from a central region at the base of the perithecium and surrounded by chains of large thin-walled cells (catenophyses). Asci unitunicate, clavate to cylindrical, thin-walled, lacking an apical apparatus, deliquescing before or at ascospore maturity, 86-137 ($\bar{x}$=115, s=12) x 34-43 ($\bar{x}$=39, s=2.7) µm. Ascospores ellipsoidal, hyaline, 1-septate, frequently becoming 3-septate with age, slightly indented at mid-septum, with conspicuous refractile oil globules at apices and around mid-septum, 26.4-38.4 ($\bar{x}$=31.9,

Fig. 1. *Halosarpheia lotica*. A. Ascospores. B. Perithecia. C. Catenophysis. D. Ascus.


A
10 µm
B
100 µm
C
D
20 µm

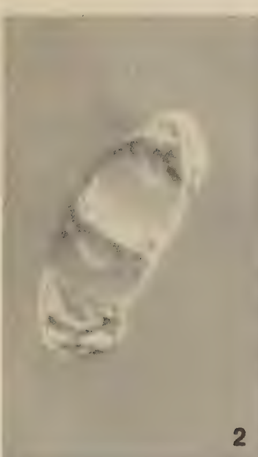
s=2.9) x 9.6-14.4 ($\bar{x}$=12, s=1.2) µm. Ascospore appendages 7-17 x 1.5-2.4 µm uncoiled, bipolar, frequently appearing to be attached slightly eccentrically, each composed of a single filament which is tightly coiled to appear hamate in side view but which is somewhat flattened into a shield-like shape by appression to the ascospore wall. Appendage uncoils in water to form a very long fine filament.

Holotype: On submerged wood collected on October 4, 1981 from the Wisconsin River, Wisconsin Dells, Wisconsin. CS-667-1, C. A. Shearer, NY Type Culture: ATCC.

A fungus collected from balsa wood blocks submerged in the freshwater portion of the Patuxent River at the Patuxent Wildlife Refuge Research Center, Laurel, Prince Georges County, Maryland on August 3, 1969 (as CS-158-1 in Shearer, 1972) appears to belong in *Halosarpheia lotica*. The measurements of CS-158-1 differ somewhat from those of CS-667-1 and are presented separately: perithecial venter- 297-495 ($\bar{x}$=396, s=73.4) µm diam.; neck - 198-416 ($\bar{x}$=320; s=66) x 39.6-59.4 ($\bar{x}$=46; s=6.6); ascus - 89-106 ($\bar{x}$=100; s=6.3) x 24-31.2 ($\bar{x}$=26.5; s=2.5); ascospores - 24.8-35.6 ($\bar{x}$=30.5; s=2.6) x 9.9-12.4 ($\bar{x}$=11.3; s=0.9).

Halosarpheia lotica is most similar to *H. retorquens* Shearer & Crane. The major differences between these two species are: (1) the ascospores of *H. lotica* are longer and wider than those of *H. retorquens*; (2) the appendages of *H. retorquens* are longer in relation to the length of the ascospore cells and are thicker than those of *H. lotica* (3) wall deposits and accumulations of oil droplets occur around the midseptum and at the apices within the ascospores of *H. lotica* but not *H. retorquens*, and (4) the asci of *H. lotica* are longer and twice as wide as those of *H. retorquens*.

Figs. 2-10. *Halosarpheia lotica*. Fig. 2. Ascospore with appendages coiled and appressed to ascospore wall x 1,048. Fig. 3. Ascospore with coiled appendage extended away from the ascospore wall x 1,258. Fig. 4. Ascospore with appendages beginning to uncoil x 915. Fig. 5. Ascospore wall (arrows indicate uneven deposition of wall material) x1,020. Fig. 6. Ascospores x 680. Fig. 7. Ascospore with uncoiling appendage x 878. Fig. 8. Ascospores held together by entangling uncoiled appendages x 453. Fig. 9. Thin-walled ascus x 397. Fig. 10. Catenophysis x 467.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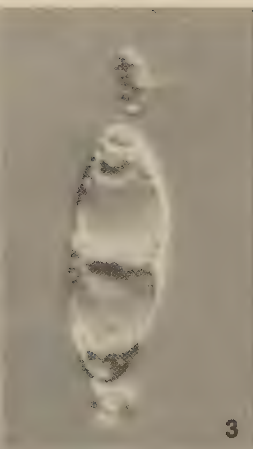
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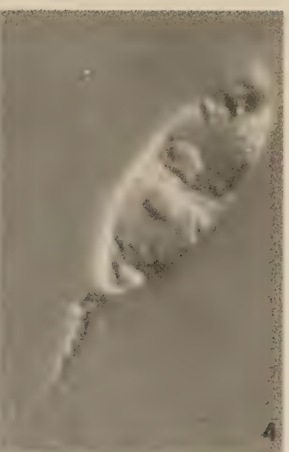
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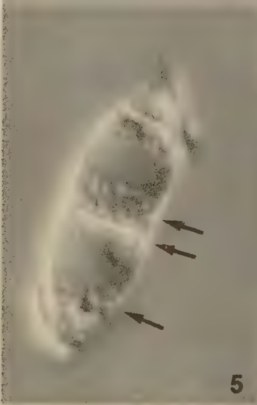
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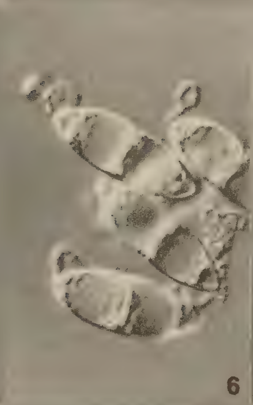
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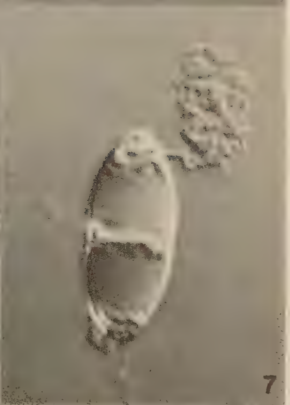
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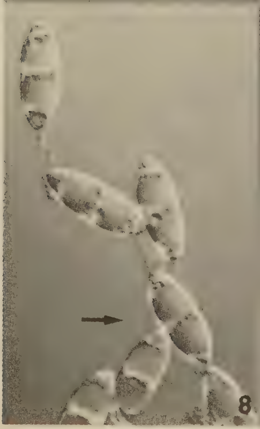
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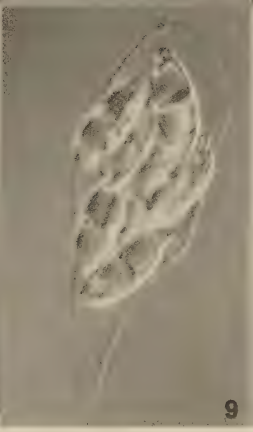
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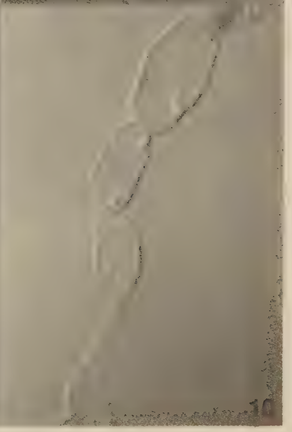
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Inner wall deposits at the midseptum and apices of H. lotica are an interesting feature. These deposits are very similar to those found in Nais inornata (Shearer & Crane, 1978) and in both species, oil droplets accumulate in the regions of deposition. Nais inornata and H. lotica share a number of similarities in morphology of perithecia, asci and ascospores. The ascospores of N. inornata are shorter than those of H. lotica and usually they are not appendaged. Collections from freshwater habitats of N. inornata, however, in which the ascospores bear apical unfurling appendages have been reported (Shearer & Crane, 1978).

Acknowledgments

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MYCOTAXON

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HARPELLOMYCES ECCENTRICUS, AN UNUSUAL HARPELLALES FROM SWEDEN AND WALES

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ABSTRACT

A new monotypic genus of Harpellaceae (Trichomycetes, Harpellales), with the type species *Harpellomyces eccentricus*, has been found living within the guts of larval Thaumaleidae (Insecta, Diptera) in two distant lotic sites: northern Sweden and Wales. This unbranched fungus differs from other Harpellaceae in having eucarpic thalli that attach to the hindgut cuticle, though young nonsporulating thalli believed to belong to this species have been found also attached to the peritrophic membrane of the midgut. Both trichospores and zygospores are described.

The two families of Harpellales, according to the concept of Manier and Lichtwardt (1968), are separated as follows: Harpellaceae have unbranched thalli that live attached to the peritrophic membrane of Diptera larvae, whereas Legeriomycetaceae are branched and attached to the hindgut cuticle of the same kinds of larvae as well as to the nymphs of Ephemeroptera and Plecoptera. Furthermore, unlike Legeriomycetaceae, Harpellaceae are holocarpic.

That is, the thalli divide completely into generative cells, all of which normally produce trichospores. Asexual and sexual reproduction are basically identical in the two families, which Moss and Young (1978) have suggested do not represent natural groupings. This new fungus, *Harpellomyces eccentricus*, certainly has characters common to both families. Unbranched, like other Harpellaceae, it nevertheless grows and sporulates in the hindgut (though apparently sometimes attaching to the peritropic membrane of the midgut but not developing to maturity), and only a distal portion of the thallus becomes reproductive. On the basis of this species' unbranched thallus it is considered a member of the Harpellaceae.

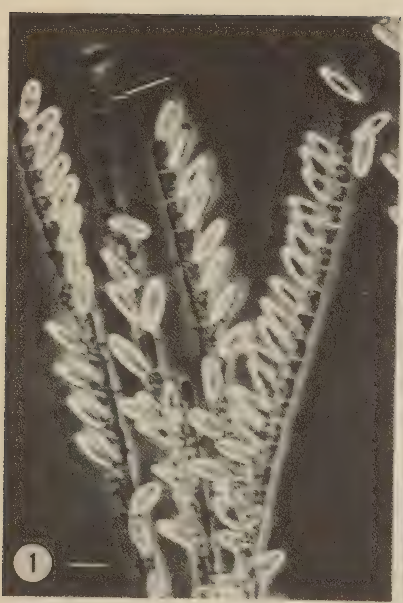
HARPELLOMYCES Lichtwardt & Moss, gen. nov.

Thalli non ramosi, vel in partibus distalibus ex ordine trichosporas sine collo ferentes, vel conjugentes et facientes zygosporas ad zygosporophorum oblique et sub medio affixas. Ad proctodaei cuticulam, et fortasse ad membranam peritrophicam, larvarum Thaumaleidarum (Insecta, Diptera) affixi.

Typus generis: *Harpellomyces eccentricus* Lichtwardt & Moss.

Thalli unbranched, producing distally a series of collarless trichospores with three appendages, or conjugating and producing zygospores attached obliquely and submedially to the zygosporophore. Attached to the hindgut cuticle, and possibly the peritrophic membrane, of Thaumaleidae (Insecta, Diptera) larvae.

Figs. 1-6. *Harpellomyces eccentricus* from larvae collected in Wales. All micrographs are of living material (phase-contrast illumination). Bar lines = 20 µm.
1. Distal, sporulating regions of five thalli showing generative cells with attached trichospores and more distal generative cells (arrow) from which trichospores have been released. 2. Sporulating regions with eccentrically attached trichospores borne in unilateral series on alternate sides of the thallus. 3. Released trichospore with three basal appendages. 4. Four young thalli attached to peritrophic membrane of midgut. 5. Two holdfasts (arrows) attached to lining of hindgut. 6. Thalli within hindgut showing wide and narrower dimensions.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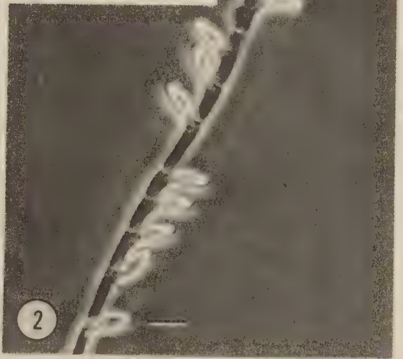
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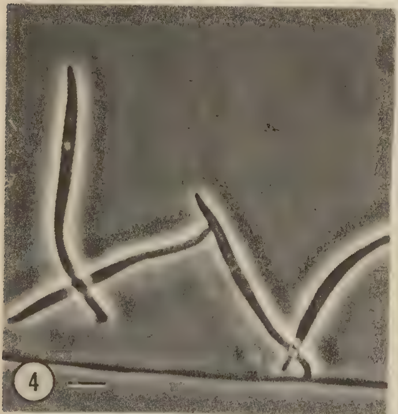
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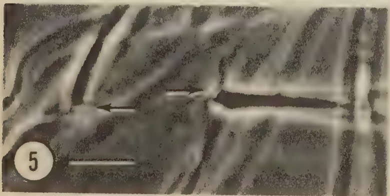
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Harpellomyces eccentricus Lichtwardt & Moss, sp. nov.
Figs. 1-11

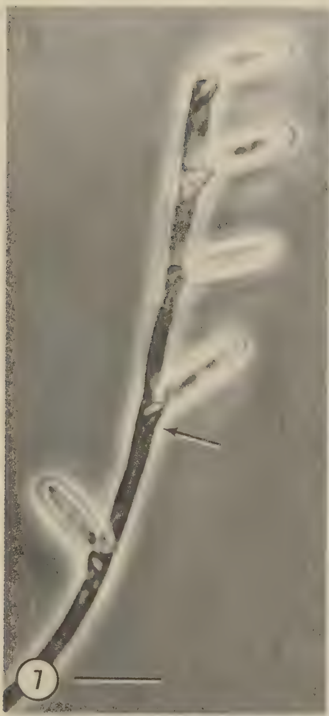
Thalli non ramosi, ad 1 mm longi, latitudine variabiles, et ad proctodaei cuticulam disco basali affixi. Trichosporae ellipticae ad subovatae, sine collo, 20-25 x 6-8 µm, ad cellulam generativam eccentrice affixae, 3-appendiculatae post liberationem. Zygosporae biconicae, 48-58 x 10-11 µm, ad zygosporophorum 20-30 x 11-12 µm oblique et sub medio affixae. In Thaumaleidarum larvis.

Unbranched thalli up to 1 mm long, generally 6-8 µm in diam, but with segments sometimes as narrow as 1.5 µm in diam. Holdfast a short basal disk. Trichospores produced from generative cells of variable lengths in series of a few to more than 30 on alternate sides of distal fertile region of thallus, oval to slightly ovoid, 20-25 x 6-8 µm, attached eccentrically to the generative cell. Upon release trichospores possess three broad appendages usually 40-60 µm long, sometimes divided at their ends. Zygospores biconical, 48-58 x 10-11 µm, attached obliquely and submedially to a zygosporophore 20-30 x 11-12 µm, both remaining together upon release. In hindgut, and possibly midgut, of larval Thaumaleidae (Diptera).

Type: Slide SWE-13-17 prepared from a *Thaumalea* sp. larva collected in Sweden, deposited with R. W. Lichtwardt, University of Kansas.

Collections: *Thaumalea* sp. larva from a small stream draining into N shore of Lake Torneträsk, across from Abisko, Sweden, 19-VII-71 (type locality). Thaumaleidae larvae from seeping waters on a steep coastal cliff at Upper Borth, Dyfed, N. Wales, United Kingdom (Grid Ref.: SN 604 887), 18-VI-80 and 19-VI-80.

Figs. 7-11. *Harpellomyces eccentricus* from larva collected in Sweden (holotype). All micrographs are of living material (phase-contrast illumination). Bar line = 20 µm for all figures. 7. Thallus producing trichospores, with appendages discernible within some of the generative cells (arrow). 8. Appendaged trichospores released from their generative cells. 9. Immature zygospore and zygosporophore attached to one of two conjugated thallial cells. 10 and 11. Released zygospores with attached zygosporophores.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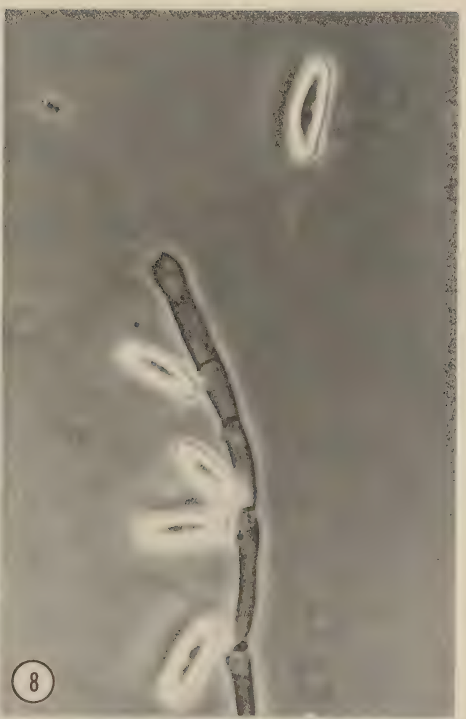
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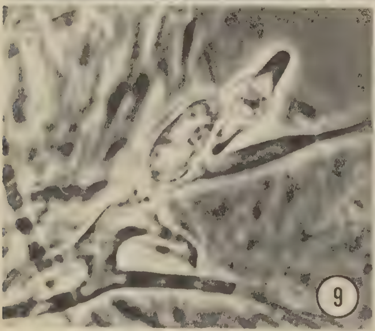
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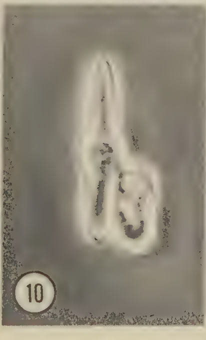
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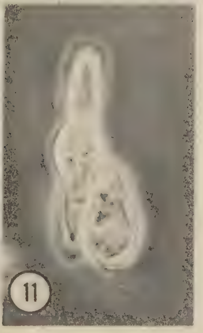
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Zygospores of *H. eccentricus* (Figs. 9-11) were found only in one larva from Sweden, which was used to prepare the type specimen. Nevertheless, the trichospores and thallial characters of the Swedish and Welsh fungi are so similar that there is little question they represent the same species. An unusual feature is the occasional extremely narrow filaments found in some thalli from both sites (Fig. 6). The trichospore appendages of *H. eccentricus* are relatively wide but difficult to see except in good preparations viewed with phase-contrast optics (Figs. 3, 8). The ends of the appendages in several instances appeared to be divided once or even twice. Occasionally two or four appendages were observed, but the normal number appears to be three. Zygospores result from scalariform conjugations of two thalli. The zygosporophore arises from one of the conjugants (Fig. 9), and the connection between those two cells is quite narrow, apparently to facilitate separation of the zygospore/zygosporophore unit from the thallus.

Harpellomyces is distinguishable as a genus on the basis of its zygospore and trichospore morphology, and *H. eccentricus* is currently the only described species of Harpellales with trichospores attached slightly to one side of the base (Figs. 1, 2, 7). M. C. Williams and Lichtwardt (1982, unpublished) have found an undescribed branching Legeriomycetaceae in the hindgut of an unidentified Diptera larva in northwestern Montana, U.S.A., with almost identical trichospores similarly attached to their generative cells, but the number of appendages could not be determined, nor were zygospores found.

In larvae from Wales we found on a number of occasions young thalli attached to the peritrophic membrane (Fig. 4), some with irregular diameters or very narrow ends. They were never seen in a more mature stage, and we believe they may have been thalli derived from germinating spores of *H. eccentricus*, but incapable of further development in the midgut region. We also occasionally found young nonsporulating thalli of a branched fungus on the hindgut cuticle. Their holdfasts somewhat resembled those of *Smittium simulii* Lichtwardt (Legeriomycetaceae). That larvae of Thaumaleidae can indeed host that genus has been ascertained by Lichtwardt (1983, unpublished) who found an apparently undescribed species of *Smittium* (possibly two species) in a larva of *Austrothaumalea* sp. in northern New Zealand.

The Thaumaleidae is a relatively small family of mostly Nearctic Diptera whose species have a restricted distribution and are not frequently encountered (Stone and Peterson, 1981). The larvae have rather strict microhabitat requirements, and very few of them are identifiable by association with described adults. Thus, the occurrence of *H. eccentricus* in two larval populations of different species of Thaumaleidae separated by more than 2000 km raises the interesting, but presently unanswerable, question of how the fungus became so distantly disseminated.

ACKNOWLEDGMENTS

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MYCOTAXON

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VALIDATION OF ECCRINOIDES HELLERIAE (ECCRINALES)

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In 1970 (1969) Manier published the name *Eccrinoides helleriae* (Léger & Duboscq) Manier (*nom. nud.*) as a new combination based on *Eccrinopsis helleriae* Léger & Duboscq (1906) (*nom. nud.*). The basionym, however, is illegitimate, because Léger and Duboscq used the name in 1906 and 1916 without providing a description of the fungus as required by Art. 32 of the Code. It was not until 1948 that Duboscq, Léger and Tuzet published a description of *Eccrinopsis helleriae*, at which time Art. 36 would have applied, but they gave no Latin diagnosis. Manier's placement of the species in the genus *Eccrinoides* Léger & Duboscq (1929) seems warranted, but the new name, to be validly published, should have been accompanied by a Latin diagnosis and an indication of the nomenclatural type.

Eccrinoides helleriae (Eccrinales, Eccrinaceae) is a distinct and interesting species. It grows in the hindgut of a terrestrial isopod, *Helleria brevicornis* Ebner (Isopoda, Tylidae), that lives in forests of the Mediterranean coast of France and islands east of the Rhône delta. It is one of four species of *Eccrinoides*, all of which inhabit either isopods or millipedes. The genus under which *Eccrinoides helleriae* was first described, *Eccrinopsis* Léger & Duboscq (1916), is not a good genus: the type species has been transferred to *Enterobryus* Leidy, and the other seven species are either synonyms or *nomina nuda* or *nomina dubia*. In validating the species below, and in the absence of any type citation, the best available illustrations have been selected as the type (Art. 9).

Eccrinoides helleriae Manier ex Lichtwardt, sp. nov.

Thalli usque ad 4 mm longitudine, 7-18 µm diametro. Sporangiosporae uninucleatae longitudine variabiles, quadrinucleatae 40-150 µm longitudine. Sub hospitis ecdyse sporae crasse tunicatae, ovales, quadrinucleatae 47-50 x 12-18 µm vel 36-40 x 12-13 µm productae. Isopodum proctodaei incola.

Holotype: Fig. 1 (*1-6*) in Manier, 1963, p. 560.

I thank the National Science Foundation, grant DEB-8019724, for support of this research, and Dr. Donald P. Rogers for the Latin diagnosis.

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A NEW SPECIES OF *CLADOSPORIUM* FROM JAPAN

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ABSTRACT

Cladosporium minourae Iwatsu, sp. nov., isolated from rotting wood in Japan, is described. It is characterized by lemon-shaped, smooth-walled, one-celled conidia, measuring 4-13 X 2.5-4.5 (average 7.1 X 3.3) µm, by producing frequently branched conidial chains composed of up to 15 conidia, and by its physiological characteristics such as having ability to grow at temperatures of up to 39 C. Other distinctive features are, lack of proteolytic activity for gelatin, requiring thiamine for growth, and being pathogenic to mice. A comparison with the following three *Cladosporium* species is presented; *C. carrionii* Trejos, *C. trichoides* Emmons and *C. cladosporioides* (Fres.) de Vries.

INTRODUCTION

Recently, the author has isolated an interesting dematiaceous hyphomycete, belonging to the genus *Cladosporium* Link ex Fr., from rotting wood in Japan. A comparison with other species of this genus, from the aspects of morphological and physiological characteristics and of pathogenicity to mice, showed the isolate to be a new species. Therefore, the name *Cladosporium minourae* Iwatsu is proposed herein for it.

MATERIALS AND METHODS

Two isolates of the new *Cladosporium* were obtained; one (DCU 422) from rotting wood in Shiroi, Chiba, Japan on February 11, 1979 and the other (DCU 428) from rotting wood in Yachimata, Chiba, Japan on September 23, 1979. Four isolates of *C. carrionii* Trejos, 4 of *C. trichoides* Emmons and 3 of *C. cladosporioides* (Fres.) de Vries were used for a comparison. The source and cultural history of the latter isolates is briefly described in Table 1.

Table 1. Source and cultural history of isolates of *C. carrionii*, *C. trichoides* and *C. cladosporioides*.

Spcies	DCU No.	Source	Cultural history
C. carrionii	302	Skin lesion	fr. Dr. M.B. de Alnornoz as No. 1316
	303	Skin lesion	fr. Dr. M.B. de Albornoz as No. 6297
	606	Skin lesion	Duke 2569
	692	Skin lesion	ATCC 16264
C. trichoides	607		Duke 2590
	611	Brain lesion	ATCC 44223=SM 1502 received as *C. bantianum*
	651	Skin lesion	fr. Dr. A. Fukumoto
	669	Rotten wood	fr. Dr. D. Dixon as DMD-38
C. cladosporioides	656	Sooty mold	ATCC 11277=IFO 6368
	658	Bamboo slates	IFO 6535
	918		fr. Dr. H. Kurata

fr.: from

For morphological study, including conidial measurements, corn meal agar slide cultures were made. These were incubated at 27 C for 2 weeks. One hundred to 239 conidia of each isolate were measured under oil immersion.

For physiological study isolates were grown at various temperatures on Sabouraud's dextrose agar and potato dextrose agar slants. Each isolate was inoculated into a set of tubes and was cultured at 4, 10, 35, 37, 39, 41, 43, 45, 47 C for 2 weeks. Gelatin liquefaction was tested using Czapek-Dox solution supplemented with 0.1 % yeast extract (Difco) and 15 % gelatin (Difco) or using 2 % malt extract (Difco) solution supplemented with 15 % gelatin (Difco). Each isolate was inoculated into a set of tubes containing

10 ml of each medium and was cultured at 20 C for 12 weeks. Thiamine requirement for growth was determined on glucose agar slants of de Vries (8), each isolate being inoculated into a set of tubes and cultured at 27 C for 2 weeks, with or without 0.5 µg thiamine hydrochloride per ml.

Pathogenicity of the two new *Cladosporium* isolates (DCU 422, 428), 3 of *C. carrionii* (DCU 302, 303, 692), 3 of *C. trichoides* (DCU 611, 651, 669) and 3 of *C. cladosporioides* (DCU 656, 658, 918) to mice was examined. Each isolate was cultured on Sabouraud's dextrose agar slants at 27 C. On the 28th day the colonies were flooded with 2-5 ml sterile 0.85 % saline containing 0.01 % Tween 80 and were scraped gently with a pipette tip. The resulting suspensions were filtrated through sterile cotton gauze to remove large hyphal strands. Then, the suspensions were diluted to contain 2 X 10^7 conidia per ml by haemocytometer count. Male ddY mice weighing 22-24 g were injected intravenously with 0.1 ml of the conidial suspensions. Three mice were used for each isolate. The mice were observed for 4 weeks or until death occurred, at which time the brains, lungs, livers and kidneys were removed. Portions of these organs were cultured on Sabouraud's dextrose agar plates containing chloramphenicol (50 µg/ml) and cycloheximide (500 µg/ml) at 27 C for 2 weeks. The remaining portions of the organs were fixed in 10 % formalin to make histological sections. The sections were stained by hematoxylin and eosin stain or by periodic acid-Schiff (PAS) stain.

TAXONOMIC PART

Cladosporium minourae Iwatsu, sp. nov. (Figs. 1, 2).

Coloniae post 14 dies ad temperaturam 27 C in agaro Sabouraudii dextrosi 21-24 mm diametro, effusae, floccosae, griseo-olivaceae; exsudatum nullum et odor absens; reverso olivaceo-nigro. Mycelium submersum ex hyphis olivaceis, laevibus, fere tenuitunicatis, 1.5-3 µm crassis compositum; hyphae aeriae paulo obscuriores. Conidiophora semi-macronemata vel micronemata, simplicia, recta vel flexuosa, 2-4 µm crassa, pallide olivaceo-brunnea, laevia, septata. Conidia catenata ramosa, unicellularia, plerumque lemoniformia, sed ad basim catenae subcylindrica vel cylindrica, 4-13 X 2.5-4.5 (mediae 7.1 X 3.3) µm, plerumque 5-8 X 3-4 µm, pallide olivacea, laevia. Catena conidiorum ex conidies minus quam 15 formans.

Teleomorphosis ignota.

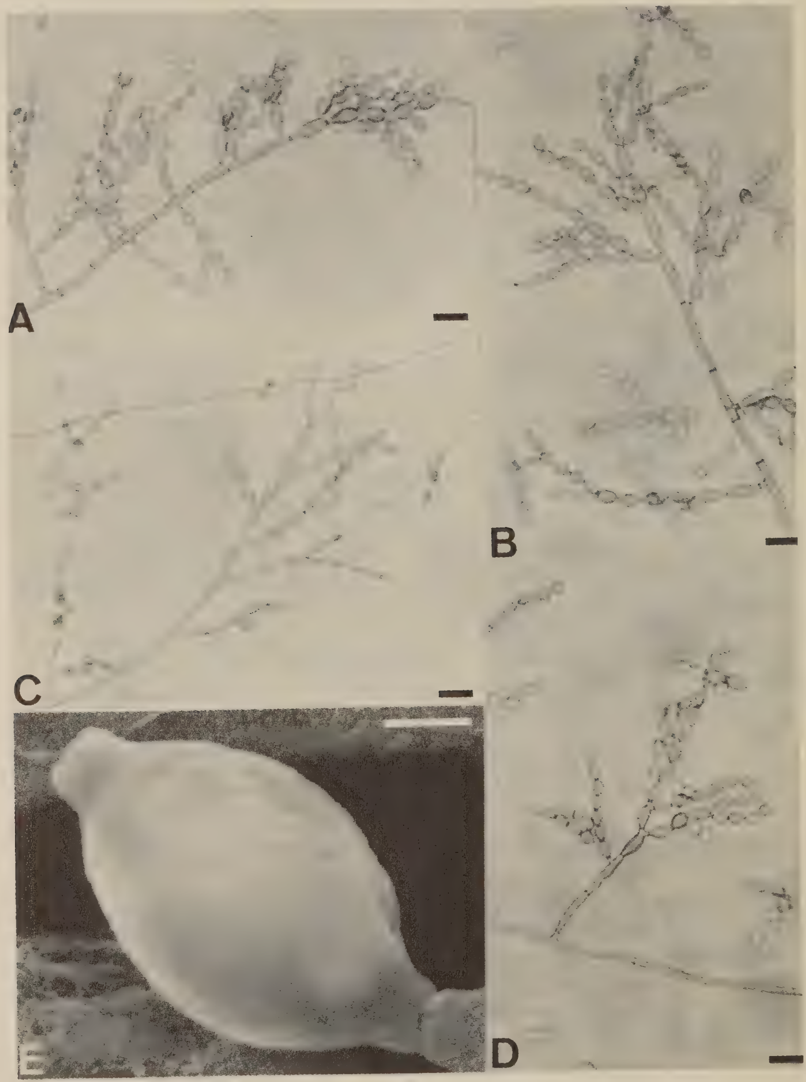

Fig. 1. *Cladosporium minourae*.
A-D) Conidiophores and conidia. Bar=10 µm. A,C,D) IFM 4700, B) IFM 4701. E) Scanning electron microphotograph of a conidium, showing smooth-walled. IMF 4700. Bar=1 µm.

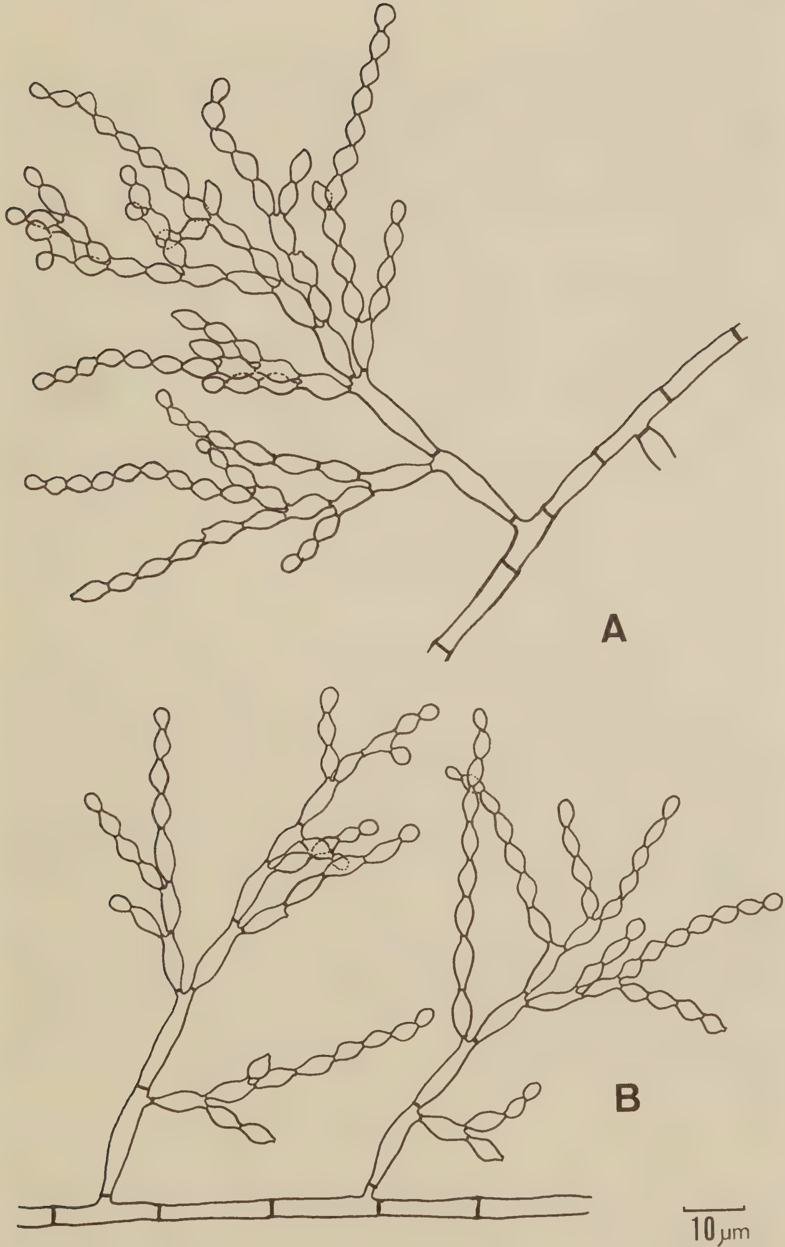

Fig. 2. *Cladosporium minourae*.
Conidiophores and conidia. A) IFM 4700, B) IFM 4701.

Holotypus: IFM 4700 in herbarione quas 'Research Institute for Chemobiodynamics, Chiba University, Chiba, Japan'. Isolatus e ligno putrido, in Shiroi, Chiba, Japonia, in 11. ii. 1979, leg. T. Iwatsu.

Etymology: *Cladosporium minourae* is named in honor of Dr. K. Minoura, Japanese mycologist.

Colonies attaining a diameter of 21-24 mm at 27 C on Sabouraud's dextrose agar within 14 days, effuse, floccose, grayish olive; exudate and odor absent; reverse olive black. Submerged mycelium composed of olivaceous, smooth, rather thin-walled hyphae, 1.5-3 µm wide; aerial hyphae slightly darker. Conidiophores semi-macronematous to micronematous, simple, straight or flexuous, 2-4 µm wide, pale olivaceous brown, smooth, septate. Conidia formed in frequently branched chains, one-celled, mostly lemon-shaped, or sometimes subcylindrical to cylindrical when borne at the base of chains, 4-13 X 2.5-4.5 (average 7.1 X 3.3) µm, mostly 5-8 X 3-4 µm, pale olivaceous, smooth. Conidial chains composed of up to 15 units.

Teleomorph is unknown.

Habitat: On rotting wood.

Materials examined: IFM 4700 (holotype), isolated from rotting wood in Shiroi, Chiba, Japan on February 11, 1979 by T. Iwatsu; IFM 4701, isolated from rotting wood in Yachimata, Chiba, Japan on September 23, 1979 by T. Iwatsu. The specimens studied are preserved at the Department of Pathogenic Fungi, Research Institute for Chemobiodynamics, Chiba University, Chiba, Japan. Living cultures of DCU 422 (derived from IFM 4700) and DCU 428 (derived from IFM 4701) are preserved at the Department of Pathogenic Fungi, Research Institute for Chemobiodynamics, Chiba University, Chiba, Japan. Subcultures of DCU 422 have been deposited at the Centraalbureau voor Schimmelcultures, Baarn, the Netherlands as CBS 556.83 and at the American Type Culture Collection, Maryland, U.S.A. as ATCC 52853.

RESULTS

The mean length and width of conidia of comparable species and their size range are shown in Table 2. The data indicate that conidial size of *C. minourae* is larger than that of *C. carrionii* and *C. cladosporioides*.

Table 2. Measurements of conidial size.

Species	DCU No.	Mean length and width (µm)	Range of length and width (µm)
C. minourae	422	7.1 X 3.3	4-13 X 2.5-4.5
	428	6.9 X 3.0	4-14 X 2.5-4
C. carrionii	302	5.1 X 2.4	3-10 X 2-3
	303	4.9 X 2.7	3-10 X 2-3
	606	4.5 X 2.4	3-10 X 2-3
	692	4.6 X 2.1	3-10 X 1.5-3
C. trichoides	607	8.4 X 2.4	5-15 X 2-3
	611	8.7 X 2.4	5-13 X 2-3
	651	6.8 X 2.9	5-11 X 2-4
	669	7.5 X 2.6	5-16 X 2-3
C. cladosporioides	656	5.2 X 2.7	3-12 X 1.5-3.5
	658	4.4 X 2.5	3-11 X 1.5-4
	918	5.5 X 2.8	4-8 X 2-4

The results of physiological study are shown in Tables 3, 4. Whereas *C. cladosporioides* grew at 4 C, no growth of *C. minourae*, of *C. carrionii* or of *C. trichoides* occurred at this temperature. Of the latter three, *C. minourae* and *C. carrionii* grew at 10 C, but *C. trichoides* failed to grow at this temperature. While *C. trichoides* has the ability to grow at a temperature of up to 41-45 C, *C. minourae*, *C. carrionii* and *C. cladosporioides* failed to grow at 41 C. Maximum growth temperature for *C. minourae*, *C. carrionii* and *C. cladosporioides* was 39 C, 37 C and below 35 C, res-

Table 3. Results of physiological study (I).

Species	No. of isolates examined	No. of isolates having ability to grow at								
		4	10	35	37	39	41	43	45	47 C
C. minourae	2	0	2	2	2	2	0	0	0	0
C. carrionii	4	0	4	4	4	0	0	0	0	0
C. trichoides	4	0	0	4	4	4	4	3	2	0
C. cladosporioides	3	3	3	0	0	0	0	0	0	0

Table 4. Results of physiological study (II).

Species	No. of isolates examined	No. of isolates having ability to liquefy gelatin	No. of isolates requiring thiamine for growth
C. minourae	2	0	2
C. carrionii	4	0	4
C. trichoides	4	0	4
C. cladosporioides	3	3	0

Table 5. Results of pathogenicity test.

Species	DCU No.	No. of mice tested	No. of mice died	Organ							
				Brain		Lung		Liver		Kidney	
				A	B	A	B	A	B	A	B
C. minourae	422	3	0	3	3	3	0	3	0	3	0
	428	3	0	3	3	3	0	3	0	3	0
C. carrionii	302	3	0	0	0	0	0	0	0	0	0
	303	3	0	0	0	0	0	0	0	0	0
	692	3	0	0	0	0	0	3	0	1	0
C. trichoides	611	3	3	3	3	1	0	1	0	1	0
	651	3	2	3	3	3	0	3	0	2	0
	669	3	3	3	3	2	0	3	0	2	0
C. cladosporioides	656	3	0	0	0	0	0	0	0	0	0
	658	3	0	0	0	0	0	0	0	0	0
	918	3	0	0	0	0	0	0	0	0	0

A: No. of mice showing positive result of recovery of culture from tissues.

B: No. of mice showing positive result of presence of fungal elements in tissue sections.

pectively. Whereas *C. cladosporioides* liquefied gelatin, *C. minourae, C. carrionii* and *C. trichoides* did not. *Cladosporium minourae, C. carrionii* and *C. trichoides* required thiamine for growth, while *C. cladosporioides* did not.

The results of pathogenicity study are summarized in Table 5. Neurological signs were observed in but one mouse inoculated with *C. minourae.* In one mouse inoculated with DCU 422, hemiparesis began to appear after the 10th day. No mice died during the experiment. Although the gross appearance of the brains of all of the sacrificed mice was apparently normal, focal granulomatous inflammation was observed in the histopathological specimens of the organs. A small amount of mycelium was recognized in the lesions. Hyphae were confined within granulomata and did not grow freely throughout the tissue (Fig. 3). Retroculture from the brains was positive in all of the mice. Although the fungus was recovered from the lungs, livers and kidneys of all of the mice, there were no lesions in these organs upon macroscopic and microscopic examination and no fungal element could be detected in tissue sections of the organs.

No neurological signs were observed in any mice inoculated with *C. carrionii.* There were no deaths. The brains of all of the sacrificed mice appeared grossly and histopathologically normal and no fungus was recovered from the organs. Although the fungus was recovered from the livers and kidneys of mice inoculated with DCU 692, no fungus was seen in these organs upon histopathological examination.

From the 3rd to 4th day, all mice inoculated with *C. trichoides* lost weight. After the 7th to 8th day torticollis or other abnormal movement began to appear in all of them. Eight out of the 9 mice died 13 to 18 days after inoculation. Autopsy revealed that black-colored foci were present in the brains of all of the dead mice. Histopathologically, cellular response of the host in the lesions was slight and abundant hyphae grew freely throughout the tissue (Fig. 4). Similar histopathological features were observed in the lesions of the brain of the sacrificed mouse. Heavy fungal growth was obtained from the brains of all of the mice. Only a few colonies grew out from other organs examined and no fungal element could be detected in tissue sections of them.

No neurological signs were observed in mice inoculated with *C. cladosporioides.* No mice died during the experiment. No fungus was recovered from the organs and no fungal element could be detected in tissue sections.

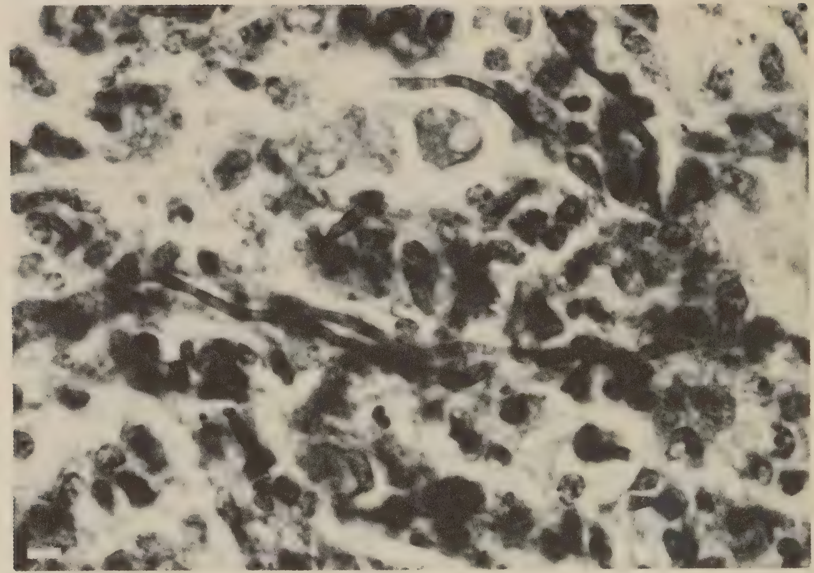

Fig. 3. Cerebral lesions induced by *C. minourae* DCU 422. A small amount of hyphae are confined within granulomata. PAS stain. Bar=5 um.

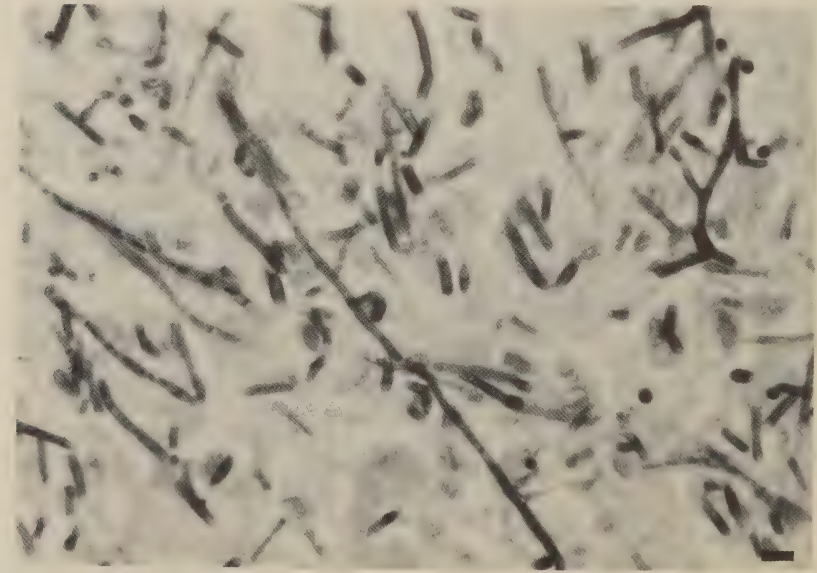

Fig. 4. Cerebral lesions induced by *C. trichoides* DCU 611. Cellular response is slight and abundant hyphae grow freely throughout the tissue. PAS stain. Bar=5 µm.

Table 6. Differential characteristics of *C. minourae*, *C. carrionii*, *C. trichoides* and *C. cladosporioides*.

Species	Mean length, mean width and shape of conidia	Conidial chain	Growth at		Maximum growth tempe-rature	Gelatin lique-faction	Thiamine require-ment	Neuro-tropism in mice
			4	10 C				
C. minourae	6.9-7.1 µm 3.0-3.3 µm lemon-shaped	frequently branched and short	-	+	39 C	-	+	+
C. carrionii	4.5-5.1 µm 2.1-2.7 µm ellipsoidal	frequently branched and short	-	+	37 C	-	+	-
C. trichoides	6.8-8.7 µm 2.4-2.9 µm ellipsoidal to oblong-ellipsoidal	branched and long	-	-	41-45 C	-	+	+++
C. clado-sporioides	4.4-5.5 µm 2.5-2.8 µm ellipsoidal or lemon-shaped	frequently branched and short	+	+	$<$ 35 C	+	-	-

DISCUSSION

Cladosporium minourae is somewhat similar to *C. carrionii*, *C. trichoides* and *C. cladosporioides*. Differential characteristics of the 4 species are summarized in Table 6. *Cladosporium minourae* is distinguishable from *C. cladosporioides* by its larger conidial size, and by its physiological and pathogenicity characteristics. Furthermore, conidia of *C. minourae* are not as readily dispersed as those of *C. cladosporioides*. It can be distinguished from *C. carrionii* by producing larger conidia, by having slightly higher maximum growth temperature, and by showing neurotropism in mice. It differs from *C. trichoides* in the shape of its conidia and the number of conidia per chain. The conidial shape of the latter is ellipsoidal to oblong-ellipsoidal and conidial chains of the latter bear up to 40 units. Furthermore, there are differences in growth temperature requirements between these two species. Although both of them exhibit neurotropism in mice, there are distinct differences in strength of pathogenicity between them.

Cladosporium minourae is also somewhat similar to *C. sphaerospermum* Penzig, *C. elatum* (Harz) Nannfeldt, *C. harknessii* (Peck) Hughes and *C. bantianum* (Sacc.) Borelli sensu Kwon-Chung et de Vries. Although living cultures of these 4 species are not available for the present comparative study, *C. minourae* appears to be readily distinguishable from them. *Cladosporium minourae* is distinguished from *C. sphaerospermum* in that conidia of the latter are often verrucose and usually subglobose or spherical (8). In addition, *C. minourae* is distinguished from *C. sphaerospermum* in that the latter cannot grow at 37 C (4) and has the ability to liquefy gelatin (6). *Cladosporium minourae* differs from *C. elatum* in colony appearance, the number of conidia per chain and physiological characteristics. While the colonies of *C. elatum* appear powdery (3), those of *C. minourae* appear rather floccose. *Cladosporium elatum* frequently produces more than 20 conidia per chain (5), has no ability to grow at 37 C (3), and has the ability to liquefy gelatin (6). *Cladosporium minourae* differs from *C. harknessii* in producing narrower conidia [The conidial size of *C. harknessii* is 6-10 X 5 µm (7)] and shorter conidial chains [*C. harknessii* produces tremendously long conidial chains (1)]. It is distinguished from *C. bantianum* in that conidia of the latter are subglobose, oval to oblong-ellipsoidal in shape and 7-15 X 3.5-6 (average 10 X 4.6) µm in size, and in that conidial chains of the latter are almost unbranched (2).

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FIVE ENDOPHYTES OF LOLIUM AND FESTUCA IN NEW ZEALAND

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ABSTRACT

Five endophytic fungi were isolated from pasture grasses in New Zealand. A Gliocladium-like species and Acremonium loliae Latch, Christensen & Samuels sp. nov. were isolated from Lolium perenne. A Phialophora-like species and A. coenophialum were isolated from Festuca arundinacea. Epichloe typhina (Persoon : Fr.) Tulasne was isolated from leaves and seed of apparently uninfected plants of F. rubra and from immature stromata on seed heads of F. rubra. These endophytes are described and illustrated and their taxonomic relationships to previously reported but unidentified fungal endophytes of Lolium and Festuca are discussed.

INTRODUCTION

Details of the morphology and distribution of endophytic fungi within seed and plants of pasture grasses have been known since the last century (McLennan 1920, for a review) but only rarely have these endophytic fungi been identified or have sporulating structures or in vitro colony characteristics been described or illustrated. Sampson (1933, 1937) isolated two endophytes from perennial ryegrass (Lolium perenne L.); one remained sterile and the second formed penicillately branched conidiophores. She (Sampson 1933) also found Epichloe typhina (Pers. : Fr.) Tul. growing endophytically within Chewings fescue [Festuca rubra L. sensu lato]. Neill (1940) isolated an endophyte from ryegrass and published a photograph of the sterile colony growing on agar. He later (Neill 1941) described microconidia and macroconidia from cultures of this endophyte. Neill (1941) isolated a second endophyte, from tall fescue (Festuca arundinacea Schreber), that he identified as Epichloe typhina. Bacon et al. (1977) also found E. typhina growing endophytically within tall fescue in the U.S.A. Morgan-Jones & Gams (1982) described Acremonium coenophialum Morgan-Jones & Gams as an endophyte of tall fescue. Balansia epichloe (Weese) Diehl has been found to be an endophyte of tall fescue, Bermuda grass [Cynodon dactylon (L.) Pers.], Sporobolus poiretii (Roem. & Schult.) Hitch., Andropogon sp. and Eragrostis sp. (Bacon et al. 1975, Porter et al. 1975) and an unidentified Balansia sp. has also been reported from Bermuda grass (Porter et al. 1975).

This paper reports five endophytes from pasture grasses in New Zealand, two from Lolium perenne, two from Festuca arundinacea and one from F. rubra. The systematic relationships of these endophytes are discussed.

MATERIALS AND METHODS

Detection of endophytes in plants and seeds.

A leaf sheath was removed from the plant, the adaxial epidermis was cut with a scalpel and then stripped from the sheath with forceps. The epidermal tissue was mounted in 0.1% cotton blue in lacto-phenol and the slide warmed for a few seconds over a flame to accelerate staining of mycelium. The slide was examined under low power of a microscope for the presence of mycelium.

The presence of viable endophyte in seed was determined indirectly by germinating fifty seeds in sterilized soil, and then examining the leaf sheaths 3-6 weeks later for mycelium.

Isolation of endophytes.

Leaf sheath tissue was surface sterilized by dipping into 70% ethanol for 5 seconds, then shaking in a solution of 10% sodium hypochlorite (0.5% available chlorine) for 5 minutes. Seed was surface sterilized by soaking in 50% sulfuric acid for 20 minutes followed by rinsing in sterile water, soaking in 10% sodium hypochlorite for 20 minutes and rinsing again in sterile water.

A method based on that described by Neill (1940) was used initially for isolations. A single piece of surface sterilized tissue, approximately 2 cm long, from the leaf sheath and adjoining proximal end of the leaf, was placed in a test tube containing 15 ml potato dextrose broth with 100 ppm penicillin and 100 ppm streptomycin. Surface sterilized seeds were also placed in test tubes of the potato dextrose broth, one seed in each tube. The test tubes were incubated at 18-22°C either in darkness or in diffused daylight for 10-14 days within which time mycelium was observed on the excised leaf tissue and on the emergent shoots of germinating seeds. After preliminary assessment of this method it was found that fungi could be isolated more easily if surface sterilized leaf tissue or seed, or mycelium from sterile Epichloe cf. typhina stromata on Chewings fescue was pushed below the surface of potato dextrose agar (PDA) in petri dishes incubated at 18-22°C.

Characterization of fungi isolated.

Descriptions of the endophytes, given below, are based on isolates grown on cornmeal dextrose agar (CMD), PDA and oatmeal agar (OA). Colony diameters were measured as shown in Table 1. All measurements were made from material mounted in 100% lactic acid. Prepared microscope slides and dried cultures of all endophytes have been deposited in the herbarium of the Plant Diseases Division, Auckland (PDD). Selected living cultures have been deposited in the Plant Diseases Division Culture Collection (PDDCC), the American Type Culture Collection and the Centraalbureau voor Schimmelcultures.

Representative cultures of all the endophytes described have been inoculated into their appropriate hosts, observed as endophytic mycelium, and successfully isolated from inoculated plants as cultures indistinguishable from those originally inoculated. These results will be described in a forthcoming publication.

DESCRIPTIONS OF THE SPECIES

Five endophytic fungi were isolated from three grasses. They were identified as Acremonium loliae n.sp. and a Gliocladium-like fungus from perennial ryegrass; Acremonium coenophialum and a Phialophora-like fungus from tall fescue; and Epichloe cf. typhina (Persoon) Tulasne from Chewings fescue.

Description of mycelium in plants.

All five endophytic fungi have septate, intercellular hyphae. Mycelium of A. loliae, A. coenophialum and Epichloe cf. typhina runs parallel to the leaf axis and is infrequently branched. A. coenophialum differs from the other two fungi in that the mycelium is slightly more convoluted.

Mycelium of a Gliocladium-like endophyte in ryegrass is strongly branched and there is a greater bulk of mycelium present than with A. loliae. When ryegrass is infected with both of these fungi it is sometimes difficult to identify the mycelium of A. loliae because of the profusion of Gliocladium-like mycelium.

Although A. coenophialum and a Phialophora-like endophyte of tall fescue are often present in the same plant, mycelium of the latter fungus is frequently branched and readily distinguished from that of A. coenophialum.

In mature plant tissue the constrictions at the septa in hyphae of all five fungi are more distinct. In the Gliocladium-like and Phialophora-like fungi these constrictions are so pronounced that the mycelium appears bead-like.

I. The Lolium endophytes

1. Acremonium loliae Latch, Christensen & Samuels, sp. nov. Fig. 1 E.

Coloniae fere lente crescunt, albae. Odor nullus. Hyphae vegetativae 1-2 µm latae. Phialides singulae ex hyphis aeriis oriundae, septo basilari adsunt, aculeatae, (8.0-)13.5-65.1(-110.0) µm longae, e 1.5-2.0 µm paulatim ad 1.0-1.5 µm angustatae. Conidia solitaria, saepe transversaliter affixa, ellipsoidea vel reniformia, hyalina, (4.0-)4.7-7.3(-13.0) x (1.5-)1.9-2.5(-3.0) µm.

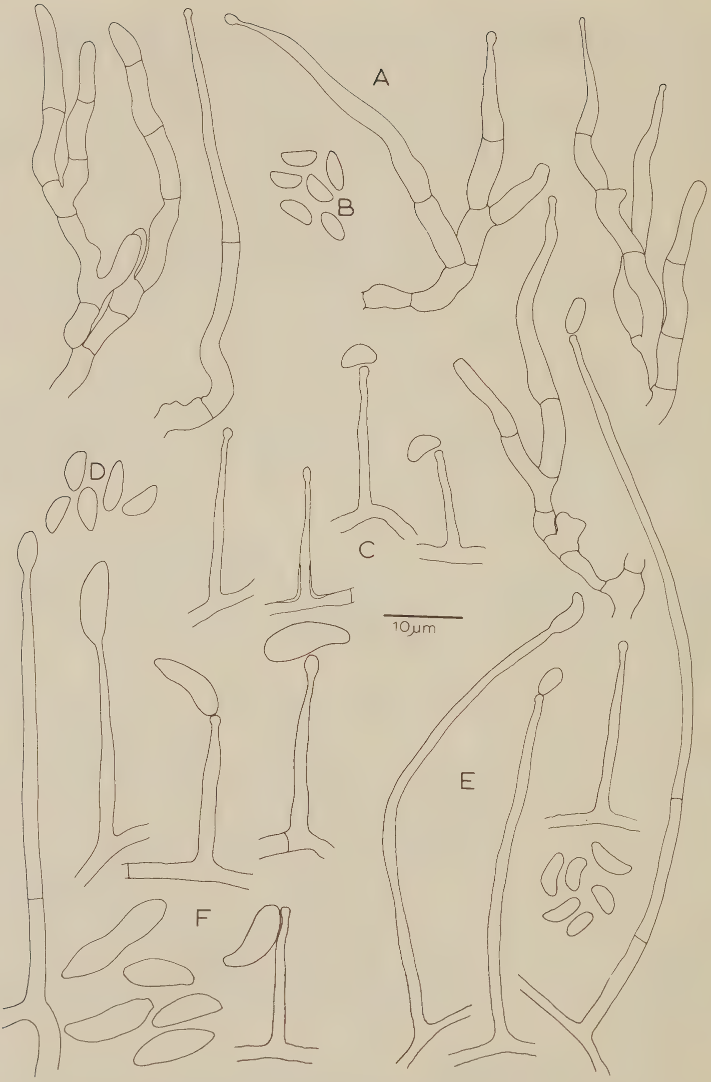

Fig. 1. A. Epichloe cf. typhina (PDD 40914) conidiophores and sterile hyphae from Festuca rubra. B. Conidia from nature (PDD 40914). C. Conidiophores from CMD, the two conidiophores on the right with transversely oriented conidia drawn directly from culture (T-6). D. Conidia from culture (T-6). E. Acremonium loliae conidiophores and conidia from CMD (R 103). F. Acremonium coenophialum conidiophores and conidia; three conidiophores on the right drawn directly from culture.

In culturis ex *Lolii perenni*, Castlepoint, North Island, New Zealand, G.C.M. Latch et M.J. Christensen R 26, 8 Sep 1981. (PDD 44517).

Colonies grown for five weeks on PDA tan, hemispherical, convoluted, aerial mycelium lacking, colony sterile (Table 1). Colonies grown on CMD and OA white, flat, waxy, with or without short, white aerial hyphae; surface of some colonies on OA tan, concolorous with the medium, flat or slightly raised, waxy and convoluted, aerial mycelium lacking. Aerial mycelium, when present, consisting of scattered, erect hyphae, less frequently scant and loosely cottony; hyphae 1.5-2.0(-2.5) µm wide. Conidiophores forming abundantly on CMD at 4° and 10°C, less abundantly at higher temperatures; only from aerial hyphae, hyaline, unbranched, straight, smooth, aseptate, tapering gently from 1.5-2.0 µm wide at base to 1.0-1.5 µm wide at tip, (8.0-)13.5-65.0(-110) µm long, lacking a basal septum or, rarely, 1-2-septate, wall not thickened, lacking a septum in the subtending hypha near the base of the conidiophore; with a single conidiogenous cell. Tip of conidiogenous cell lacking periclinal thickening and not flared, either bearing a developing conidium or closed, conidia produced singly, often transversely positioned on the tip of the conidiophore. Conidia ellipsoid to reniform, ends rounded, lacking a basal abscission scar, (4.0-)4.7-7.3(-13.0) x (1.5-)1.9-2.5(-3.0) µm [N = 207, M_1 = 6.0, SD = 1.3 µm; M_w = 2.2, SD = 0.3 µm] unicellular, hyaline.

TABLE 1. Growth of *Epichloe* cf. *typhina*, *Acremonium loliae* and *A. coenophialum* measured after 3 and 5 weeks in darkness.

	Colony diameter[1] (mm, 3 weeks/5 weeks)					
Temperature (°C)	0	4	10	15	20	25
Epichloe cf. *typhina*						
OA	+/+[2]	10/20	9/15	10/25	29/40	28/45
PDA	+/+	12/17	10/15	8/25	32/47	32/50
CMD	+/+	12/20	6/17	13/27	35/45	32/45
Acremonium loliae						
OA	0[3]/0	+/8	+/7	5/7	8/15	8/15
PDA	0/+	+/9	+/8	+/9	+/8	+/9
CMD	0/+	+/7	+/7	7/8	9/10	6/11
Acremonium coenophialum						
OA	+/+	+/+	+/+	+/7	8/15	8/17
PDA	0/0	+/8	+/8	+/7	10/18	8/18
CMD	+/+	+/6	+/6	+/8	9/17	9/17

[1] Diameter includes 3 mm diam. plug of inoculum (CMD).

[2] Erect hyphae evident on the inoculum.

[3] No growth evident on the inoculum.

HOLOTYPE: Isolated by G.C.M. Latch & M.J. Christensen R 26, 8 Sep 1981, from leaf tissue of *Lolium perenne* collected at Castlepoint (PDD 44517, PDDCC 8360).

Isolated from seeds and leaf sheaths, but not from roots, of 480 plants of *Lolium perenne* collected in the North Island and from Canterbury. The following isolates are considered to be typical: R 100 (PDD 44528, PDDCC 8361), R 150 (PDD 44496, PDDCC 8362), R 103 (PDD 44529, PDDCC 8363).

2. *Gliocladium*-like isolates Fig. 2 A-C.

Colonies grown five weeks on PDA forming a cottony, white, hemispherical button over the inoculum, colony otherwise flat; aerial mycelium felty on PDA but lacking on CMD and OA; yellow pigment evident in colony reverse of all media but most pronounced on PDA. Hyphae 1.5-2.0 µm wide, septate, branched, often forming loops on surface of agar and in aerial hyphae. Indehiscent, *Chrysosporium*-like cells, 3-6 x 1.5-2.0 µm arising laterally and terminally on immersed hyphae. Colonies generally sterile, occasionally a few *Gliocladium*-like conidiophores arising as lateral branches of aerial hyphae. Conidiophores well differentiated, mononematous, straight, smooth, colorless to pale yellow, 10-15 x 3-5 µm, branching apically to form a penicillus of phialides. Phialides cylindrical, 10-15 x 3.0-3.5 µm, held singly or in whorls of up to 5 directly on conidiophore or on metulae ca. 10 µm long; metulae, hyaline, smooth, tip with periclinal thickening, not flared, conidia held in heads of colorless slime. Conidia oblong to ellipsoid, with a round to flat base, (3.0-)3.6-5.0(-6.0) x (1.5-)1.8-2.3(-2.5) µm [N = 44, M_l = 4.3, SD = 0.7 µm, M_w = 2.0, SD = 0.3 µm].

Isolated from seeds, roots and leaf sheaths of 87 plants of *Lolium perenne* collected in the central region of the North Island and from Canterbury. The following isolates are considered to be typical: R 72 (PDD 44526, PDDCC 8479), R 161 (PDD 44531, PDDCC 8498), R 169 (PDD 44534, PDDCC 8499).

TABLE 2. Growth of *Gliocladium*-like ryegrass endophyte after 3 and 5 weeks growth in darkness.

	Colony diameter[1] (mm, 3 weeks/5 weeks)					
Temperature: (°C)	0	4	10	15	20	25
Media:						
OA	+[2]/5	22/47	20/45	23/52	7/18	7/12
PDA	+/5	25/47	24/52	35/47	7/21	7/13
CMD	+/5	20/35	20/37	22/37	9/18	5/10

[1] Diameter includes 3 mm diam. plug of inoculum (CMD).

[2] Erect hyphae evident on inoculum.

II. The *Festuca* endophytes

1. *Epichloe* cf. *typhina* (Persoon : Fr.) Tulasne, Sel. Fung. Carp. 3: 24. 1865. Fig. 1 A-D.

Anamorph: *Sphacelia typhina* Saccardo, Michelia 2: 297. 1881.

= *Acremonium typhinum* Morgan-Jones & Gams, Mycotaxon 15: 315. 1982.

Colonies grown five weeks on PDA, CMD and OA with short, white to ivory, aerial hyphae, or no aerial mycelium (diameters given in Table 1). Colonies grown on OA waxy with very little or no aerial mycelium, tending to become wrinkled with age. Colony reverse on PDA with light brown coloration in the center; colony reverse on CMD white. Hyphae 1-2 µm wide. Conidiophores forming abundantly in all media from aerial hyphae and from surface of colony, hyaline, unbranched, straight, smooth, aseptate. Tapering gently from 1.0-1.5(-2.0) µm wide at base to 0.5-1.0 µm wide at tip, (8.0-)11.6-19.7(-20.0) µm long, lacking a basal septum, with or without a septum in the subtending hypha near the base of the conidiophore, wall of base of conidiophore sometimes thickened; with a single conidiogenous cell. Tip of conidiogenous cell lacking periclinal thickening and not flared, either bearing a developing conidium or closed, conidia produced singly, often situated transversely at the tip of the conidiophore. Conidia ellipsoid to asymmetric and shaped like an orange fruit segment, with one side flattened and one side curved, lacking an obvious basal abscission scar. (3.5-)4.3-5.7 (-9.0) x (1.5-)1.9-2.7(-4.0) µm [$N = 231$, $M_1 = 5.0$, $SD = 0.8$ µm, $M_w = 2.3$, $SD = 0.4$ µm], unicellular, hyaline.

Isolated from mycelium of young *Epichloe* stroma on six plants and from leaf sheaths of ten symptomless plants of *Festuca rubra* from the central region of the North Island. The following isolates are considered to be typical: T 2 (PDD 44550, PDDCC 8509), T 4 (PDD 44547, PDDCC 8500), T 5 (PDD 44548, PDDCC 8501), T 6 (PDD 44549, PDDCC 8502).

NOTE. Sampson & Western (1954) and Western & Cavett (1959) described the disease cycle of *E. typhina* and noted that conidia are formed on young stromata but they did not give morphological details of this anamorph. Booth (1979) reported that young stromata of *E. typhina* are covered with *Acremonium*-like conidiophores but he neither described nor illustrated details of the conidiophores. Six of our New Zealand isolates of *Epichloe* cf. *typhina* were derived from mycelium and conidia of the young stroma that was found on culms of Chewings fescue. There were no obvious signs of perithecial formation on these stromata. Perithecia of *E. typhina* have not been reported from New Zealand and the fungus has only recently been noticed in the country from *F. glauca* Lam. (Hedley & Braithwaite 1978).

The culms of Chewings fescue were girdled by a 1.5-3.0 cm long, white stroma that was composed of tightly compacted, 3 µm wide hyphae that were arranged perpendicularly to the surface of the stroma. Conidiophores (Fig. 1 A) were unbranched, septate, 22-55 µm long and formed in a compact layer over the surface of the stroma, each as an extension of underlying hyphae. A single conidiogenous cell constituted the terminal 17-26 (-38) µm of each conidiophore. The tip of the conidiogenous cell lacked obvious periclinal thickening and was closed. Simple conidiophores, as found in culture (Fig. 1 C), were not observed in our material. Conidia were as found in culture (Figs. 1 A,D). Sterile, 3-4 µm wide hyphal hairs arose from the base of conidiophores or arose separately from stromal hyphae; they were septate, thin-walled, smooth with round tips and attained the same length as the conidiophores. These observations broadly agree with those of Vincens (1917, fig. 65) for *E. typhina*.

2. *Acremonium coenophialum* Morgan-Jones & Gams,
Mycotaxon 15: 313. 1982. Fig. 1 F.

Colonies grown five weeks on PDA, CMD and OA flat, aerial mycelium lacking to short, white, surface of colony appearing felty (colony diameters given in Table 1). Colonies grown on OA waxy and wrinkled with little or no aerial mycelium with age. Aerial hyphae on CMD branched, 1.5-2.0 µm wide. Conidiophores forming abundantly on all media from aerial hyphae and from surface of colony, hyaline, unbranched, straight, smooth, aseptate, or, rarely 1-septate near base, tapering gently from 1.5-2.0 µm wide at base to 0.5-1.0 µm wide at tip, 12-56(-155) µm, some at the ends of hyphae and then indeterminate in length, lacking a basal septum, with or without a septum in the subtending hyphae near the base of the conidiophore, wall same width as hyphal wall; with a single conidiogenous cell. Tip of conidiophore lacking periclinal thickening and not flared, either bearing a developing conidium or closed, conidia produced singly, often transversely positioned on the tip of the conidiophore. Conidia ellipsoid to falcate, tip round to subacute, base round or with a protuberant, flat abscission scar, (7.0-)9.3-12.8 (-17.5) x (2.0-)2.4-3.6(-5.0) µm [N = 305, M_1 = 11.0, SD = 1.8 µm, M_w = 3.0, SD = 0.6 µm], unicellular, hyaline.

Isolated from seeds and leaf sheaths, but not roots, of 55 plants of *Festuca arundinacea* from the central region of the North Island; three isolates from the U.S.A. were also studied. The following isolates are considered to be typical: F 23 (PDD 44543, PDDCC 8503), F 27 (PDD 44544, PDDCC 8508), F 35 (U.S.A.) (PDD 44546, PDDCC 8504).

3. *Phialophora*-like isolates Fig. 2 D.

Colonies grown three weeks on PDA, CMD and OA raised over the original inoculum and aerial mycelium densely cottony, colony otherwise flat with scant aerial mycelium; aerial mycelium white to off white to light tan or yellowish tan with some brown to grey coloration in center of colony reverse; colonies on OA with slightly spreading brown pigment. Sometimes yellow drops of liquid forming in aerial mycelium of all media and sometimes with yellow coloration in reverse of colonies grown on OA. Hyphae

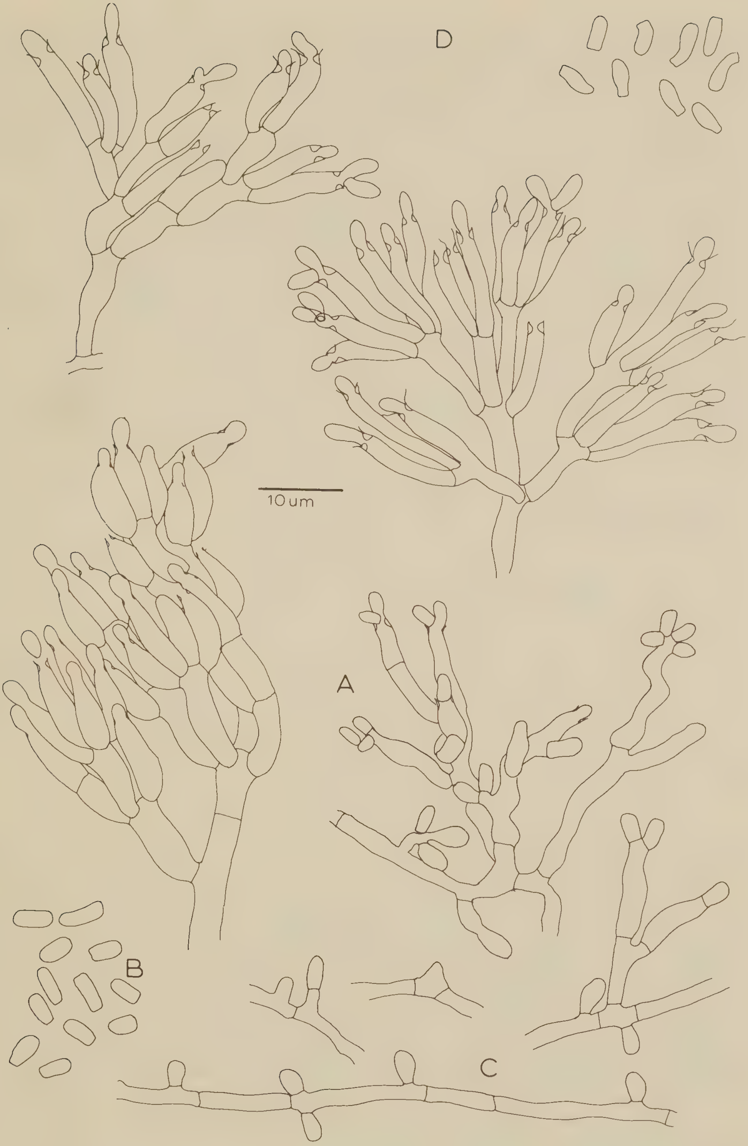

Fig. 2. Gliocladium-like endophyte of Lolium perenne.
A. Conidiophores (R 162 on right, R 169 on left).
B. Conidia (R 162). C. Indehiscent hyphal protuberances. D. Phialophora-like endophyte of Festuca arundinacea.

2-3 µm wide, septate, branching. Conidial production more profuse on OA than on CMD. Conidiophores arising from surface of colony and in aerial mycelium, tending to form in fascicles, hyaline, smooth, 25-70 µm long, penicillately branched at the tip, branches 8-10 µm long, each bearing a penicillus of phialides. Phialides cylindrical, (8-)10-15 (-18) x 2-4 µm, hyaline, smooth, tip with pronounced periclinal thickening or periclinal thickening not evident, often widely flared; often with one or two conidia attached to the phialide tip within the collarette, conidia held in heads of colorless slime. Conidia oblong to ellipsoid to clavate with a flat base, 1 µm wide (3.0-) 3.8-5.4(-7.0) x (1.5-)1.7-2.2(-2.5) µm [N = 67, M_l = 4.6, SD = 0.8 µm, M_w = 1.9, SD = 0.2 µm], unicellular, hyaline.

Isolated from seeds, roots, and leaf sheaths of 48 plants of Festuca arundinacea from the central region of the North Island. The following isolates are considered to be typical: F 9 (PDD 44551, PDDCC 8505), F 17 (PDD 44552, PDDCC 8506), F 20 (PDD 44542, PDDCC 8507).

TABLE 3. Growth of Phialophora-like fescue endophyte after 3 weeks in darkness.

	Colony diameter[1] (mm)			
Temperature: (°C)	10	15	20	25
Media				
OA	12	15	6	+[2]
PDA	15	15	6	+
CMD	9	12	5	+

[1] Diameter includes 3 mm plug of inoculum (CMD).

[2] Erect hyphae evident on inoculum.

DISCUSSION

Acremonium endophytes.

Several recent papers (Fletcher & Harvey 1981, Gallagher et al. 1981, Latch & Christensen 1982, Fineran et al. 1983) have discussed the relationship of the toxic syndrome Ryegrass Staggers in cattle and sheep to "Neill's first Lolium endophyte." In none of the recent papers that have discussed "Lolium endophyte" has the fungus under study been described or named and evidence has not been presented that the fungus was actually the same fungus that Neill (1940, 1941) studied. The identity of the fungal object of these recent studies is therefore in doubt.

What is "Neill's Lolium endophyte?" We will never know the answer to this question because Neill left no specimens of it. Neill (1940) first described a non-sporulating endophyte that had waxy, convoluted colonies on PDA. Later (Neill 1941) he described microconidia and macroconidia that formed in cultures of the "first endophyte" that had been incubated for five to eight weeks on rye seed, and PDA and soil. These conidia were similar to but distinct from those formed by *Gloeotinia granigena* (Quelet) Schumacher [= *G. temulenta* (Prill. & Delacroix) Wilson, Noble & Gray], the cause of blind seed in ryegrass (Neill & Hyde 1939). The overall morphology of the microconidial and macroconidial sporodochia are as described for *G. granigena* and it is possible that Neill was observing a species of *Gloeotinia*.

Neill (1940) obtained his first endophyte from "over 90 percent of infected seedlings from three lines of certified perennial." The cultures that he described and the high incidence of this cultural type in ryegrass, strongly suggest *Acremonium loliae* as described above. If Neill was isolating *A. loliae*, the subsequently observed sporulation could have been of a contaminant. We followed his techniques for isolation of endophytes and occasionally isolated *G. granigena* and *A. loliae* from the same seedling. We did not encounter any fungus with the combination of cultural characters (Neill 1940) and conidia (Neill 1941) of Neill's "first endophyte."

Sampson (1933) reported endophytic mycelium in seed, leaves, stems and tiller buds of darnel (*Lolium temulentum* L.) and ryegrass and she later (Sampson 1937) published cultural details of the fungus that she isolated from ryegrass and referred to as the "first endophyte." Although she did not observe sporulation for this species, the cultures that she described and illustrated (Sampson 1937, Pl. IX, fig. 12) are similar to those produced by *A. loliae* in our study and we believe that Sampson's "first endophyte" was *A. loliae*. That neither Sampson (1937) nor Neill (1941) observed conidia in their isolates might be explained by the fact that *A. loliae* sporulates poorly at temperatures above 15°. Neither Sampson nor Neill were able to isolate the darnel endophyte.

In our work (unpublished), the fungus most commonly isolated from ryegrass was *Acremonium loliae*, and this species was consistently associated with outbreaks of Ryegrass Staggers. Work is continuing on the relationship of this fungus to this toxic syndrome.

Another species of *Acremonium* has been linked to animal toxicity. *A. coenophialum* was originally isolated as an endophyte of tall fescue in Alabama, U.S.A. (Morgan-Jones & Gams 1982) and Morgan-Jones & Gams (1982) briefly remarked on the association of this species with "fescue toxicity" in cattle. Bacon et al. (1977) reported the association of *Epichloe typhina* with this toxic syndrome but the conidia that they described were larger than those reported by Brefeld & Tavel (1891) and Morgan-Jones & Gams (1982) for *E. typhina*. The distinctive conidia and wrinkled colonies that Bacon et al. (1977) described resemble those of *A. coenophialum*. Three of our isolates of *A. coenophialum* originated in Kentucky, U.S.A. The U.S.A. and New Zealand isolates agree in every respect with the original description of *A. coenophialum*. Neill (1941) described and illustrated an *Acremonium*-like anamorph that he found to be endophytic within apparently healthy tall fescue plants in New Zealand. He referred to his fungus as *E. typhina*. Morgan-Jones & Gams (1982) suggested that this fungus could have been *A. coenophialum* and we agree.

Acremonium loliae, *A. coenophialum* and the *Acremonium*-like anamorph of *Epichloe typhina* (sensu Brefeld & Tavel 1891) are strikingly similar in morphology and cultural features. These three anamorphs form a distinctive and homogeneous group for the following reasons: 1). the base of the conidiogenous cell consistently lacks a septum; 2). there is no periclinal thickening at the tip of the conidiogenous cell, which is either closed or bears a developing conidium; and 3). usually only one conidium, and at most two, are found at the tip of the conidiogenous cell, and that conidium is often transversely situated. These species vary from typical *Acremonium* (Gams 1971, Samuels 1976) wherein conidiophores are basally septate, phialides have periclinal apical thickening, and conidia are held in a conspicuous drop of liquid.

Morgan-Jones & Gams (1982) described the anamorph of *E. typhina* as *Acremonium typhinum* Morgan-Jones & Gams. They did not illustrate periclinal thickening at the conidiogenous locus. Although they did not state whether conidia are borne in a drop of liquid, they did describe transverse positioning of a single conidium at the tip of the conidiogenous cell. Brefeld & Tavel (1891) isolated ascospores of *E. typhina* into pure culture and illustrated (Taf. V, figs. 59, 62) transverse positioning of a single conidium in the anamorph, but conidiophores differed from those described for *A. typhinum* in lacking a basal septum. Although it was not stated whether the type culture of *A. typhinum* was isolated from fungal fructifications or from plant tissue, one isolate of the species was derived from ascospores. These different anamorphs indicate the existence of two taxa whose perithecia are morphologically similar. Our New Zealand isolates are derived from mycelium in tissue of plants of Chewings fescue that lacked stromata of *E. typhina* and from mycelium of young *Epichloe* stromata of other plants, and agree with Brefeld & Tavel's (1891) illustrations.

Saccardo (1881) described the anamorph of *E. typhina* as *Sphacelia typhina* Sacc. [as '(Pers.) Sacc.'] and this name has generally been accepted for the anamorph of *E. typhina* (Subramanian 1971, Arx 1981). Morgan-Jones & Gams (1982) were unable to find the described fungus on either of the isotype specimens of *Sphacelia typhina* in Saccardo's herbarium (PAD); they did not examine other naturally formed anamorphs of *E. typhina* and they did not discuss whether *Sphacelia* Lev. is the appropriate genus for this anamorph.

Sphacelia segetum Lev., the type species of *Sphacelia*, is the anamorph of *Claviceps purpurea* (Fr.) Tul., another graminicolous member of the Clavicipitales. In this anamorph *Acremonium*-like conidiophores form in a compact palisade on the surface of the ergot sclerotium (Tulasne 1853, Roger 1953, fig. 228; Barnett & Hunter 1972). The anamorphs of Epichloe typhina and Claviceps purpurea have the same basic morphology and therefore seem to be congeneric. The form of these anamorphs in nature is comparable to the Ephelis anamorph of a third graminicolous member of the Clavicipitales, Myriogenospora atramentosa (Berk. & Curt. in Berk.) Diehl (Rykard et al. 1982). Anamorphs of graminicolous members of the Clavicipitales thus have complex conidiomata that conform to the contour of the presexual stroma. The same is observed in other non-clavicipitaceous ascomycetes. Perithecia of Nectria cinnabarina (Tode : Fries) Fries form on the surface of the sporodochium of Tubercularia vulgaris Tode after the cessation of conidial production (personal observation). When Epichloe typhina or N. cinnabarina are grown in pure culture, however, conidiophores do not aggregate into stromata, and in Myriogenospora atramentosa and other members of the tribe Balansiae (Diehl 1930) conidiogenous hyphal aggregates and non-aggregated conidiophores form in agar culture. Separate generic names are not given to the cultural expressions of the Balansiae or Nectria and we do not believe that the cultural expression of E. typhina warrants a separate name in Acremonium. Therefore, we reject Acremonium typhinum as the appropriate name for the anamorph of Epichloe typhina. In the absence of a critical review of taxonomy of the anamorph genera attributed to the graminicolous Clavicipitales, we prefer to refer the anamorph of E. typhina to Sphacelia.

That conidia and conidiophores of Acremonium coenophialum and A. loliae are so strikingly similar to those of the Acremonium-like conidiophores formed in cultures of E. cf. typhina suggests that there may be three species of Epichloe present in New Zealand pasture grasses but that they rarely or never form visible fructifications. We accept these species in Acremonium sect. Albo-lanosa Morgan-Jones & Gams (1982) on the basis of morphology of the conidiophore alone and in the belief that they are clavicipitaceous anamorphs and probably unrelated to other Acremonium species. Because periclinal thickening is not seen in the tip of the conidiogenous cell and because only one conidium is borne on each conidiogenous cell, it is possible that conidiogenesis in these three species is holoblastic, thus separating them further from other Acremonium species. Whether A. coenophialum and A. loliae should be placed in a separate genus should be considered by specialists in hyphomycete taxonomy. Conidiogenesis in Myriogenospora atramentosa is holoblastic but the conidiogenous locus proliferates sympodially after the formation of each conidium (Rykard et al. 1982).

The Gliocladium and Phialophora endophytes.

The Gliocladium-like and Phialophora-like endophytes described in this paper are very generalized in morphology. Their generic names reflect that morphology without implying phylogenetic relationship to other species of the genera. We refer to the ryegrass endophyte as being

"Gliocladium-like" because of the light pigmentation in the colony, and the penicillate arrangement of phialides, because the tips of the phialide are neither flared nor cupulate or tubular, and because the conidia are unicellular, colorless and held in colorless slime. The tall fescue endophyte is referred to as being "Phialophora-like" because of the brown pigmentation of some colonies, because phialides often had widely flaring apical collarettes, and because conidia are unicellular and held in slime. This endophyte bears at least some morphological resemblance to branched species of Phialophora Medlar (Schol-Schwarz 1970). We do not know whether either of these endophytes forms complex conidiomata in nature.

The Gliocladium-like and Phialophora-like endophytes described above bear morphological similarities to endophytes previously found in Lolium species by Sampson (1937) and referred to as the "second endophyte." Sampson (1937, figs. 10-14) described and illustrated a seed-borne endophyte of Lolium perenne that was penicillately branched and that formed conspicuous hyphal loops in the aerial mycelium. The mycelium on oatmeal agar was cottony and white to cream in color and a "chrome-yellow" pigment formed in the medium. Conidia formed abundantly, were hyaline and avoid, measured 2.0-2.5 x 1.5 µm, and were referred to as microconidia. Details of conidiogenesis were not given. These conidia are smaller than those of our Gliocladium-like and Phialophora-like endophytes. Sampson's "second endophyte" and our Gliocladium-like endophyte appear to differ only in conidial size.

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FINNISH RECORDS OF DISCOMYCETES: A NEW SPECIES IN THE MONOTYPIC GENUS DESMAZIERELLA (PEZIZALES)

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SUMMARY

A new species, *Desmazierella piceicola*, occurring on needles of *Picea abies* is described. In many characters it is related to *D. acicola* Lib., but differs especially in the gigantic and fusoid spores with cyanophilous ridges. The genus *Desmazierella* is considered to belong to the family Sarcoscyphaceae, tribe Pithyeae.

Studies on collections of the University of Turku Herbarium (TUR) revealed a discomycetous specimen with an unusual combination of characters. The collection was on a largely decomposed spruce needle dating from 1965. Only two apothecia were observed, and type material is therefore scanty. However, original drawings and permanently mounted material on slides are enclosed in the type collection. The type locality has since been visited frequently but without result.

Desmazierella piceicola Huhtinen & Mäkinen, spec. nov.

Apothecia 1 mm lata, breviter stipitata, ad maturitatem cupulata. Hymenium griseum, brunneosetosum; apothecia exteriori parte brunnea, dense pilosa. Excipulum externum hyalinum vel brunneum, textura prismatica vel textura angulari, bistratus vel tristratus, cellulis 10-15 X 6-10 µm. Excipulum medullarum hyalinum, textura intricata, hyphis ad 5-10 µm latis, ramosis, non gelatinosis. Pili usque ad 1000 µm longi, erecti et setosi vel flexuosi, multiseptati, superficiali, parietibus usque ad 3 µm crassis, brunneis vel atrobrunneis, irregulariter granulosis; brevissimi pili abundantes, brunnei, granulati, 10-20 X 5-9 µm. Asci 300 X 12 µm, tetraspori, cylindracei, parietibus crassis, non amyloidei, basi irregulariter bifurcata, opercula apicalia, crassa. Ascosporae 48-52 X

11-12 μm, uniseriatae, pallide luteae, fusoides, multiguttulatae, apiculatae, in longitudine costatae; costae cyanophilae, anastomosantes; apiculi persistentes. Paraphyses tenues cylindraceaeque, ad 2-3 μm latae, septatae, ramosae, anastomosantes, multinucleatae, ad apicem brunneogranulatae, pro parte minore setosae et crassotunicatae, ascos 80 μm superantes.

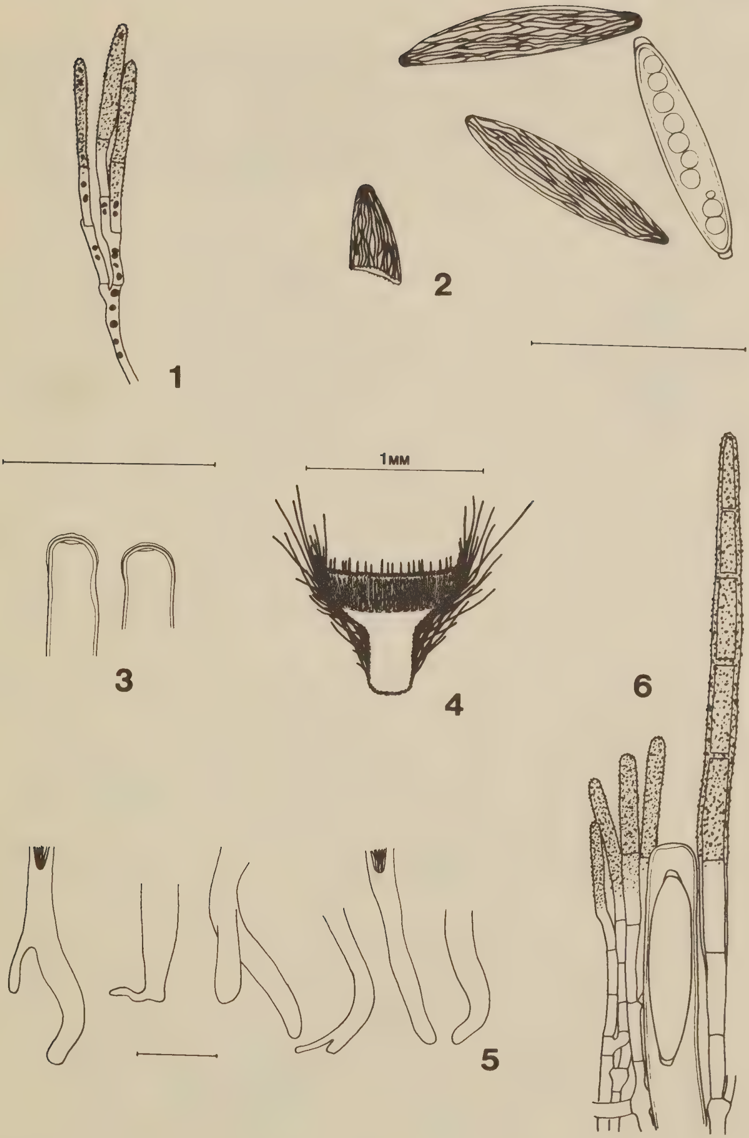
Holotypus in foliis emortuis Piceae abietis, "SW Finland, Turku, Ruissalo, W-side of the nature protection area" grid 27° E 67121:2335, Sept. 26, 1965, Y. Mäkinen (TUR 62942)

Apothecia cupulate, up to 1 mm in diameter when dried, shortly stipitate, externally densely covered by dark brown hairs, disc grey when fresh.

Ectal excipulum of two to three layers of textura prismatica - textura angularis, cells measuring 10-15 X 6-10 μm, walls thickened, hyaline to pale brown, the common wall of two adjacent cells 1 μm thick; at least on the flanks this layer may be delimited inwards by a layer of amorphous, brown encrustation. Medullary excipulum of hyaline textura intricata, at stipe base somewhat thick-walled (0.5 μm), otherwise thin-walled, hyphae 5-10 μm wide, frequently branching, septae strongly coloured in cotton blue and Congo red, strongly stained septal collars surrounding the septal areas are lacking; towards ectal parts hyphae may run parallel to the surface, forming a narrow and indistinct layer of textura porrecta.

Three types of hairs are present. Stiff and pointed hairs. up to 800 μm long, not rooting, dark brown to very dark brown, tapering to a blunt or pointed apex, variously granulated, some areas smooth, some with a very dense covering of insoluble, hyaline to brown, firmly attached granules, walls 1-3 μm thick, septae up to 1 μm thick. The hairs up to 1000 μm long are similar to those described above, basally stiff, but tapering to a long, flexuous, smooth apical part with brown walls 0.8 μm thick. Majority of the outermost cells of ectal excipulum run into brown to pale brown, short, encrusted, blunt and widely cylindrical hairs measuring ca. 10-20 X 5-9 μm. The margin composed of short hairs similar to apices of paraphyses.

Spores uniseriate, 48-52 X 11-12 μm (including apiculi), fusoid to somewhat inequilaterally fusoid with constant apiculi colouring in cotton blue, Congo red, Melzer's reagent and acetocarmine, de Bary bubbles absent, with many guttules, light yellow in lactic acid; ornamentation consisting of longitudinal, very low ridges, anastomosing, always cyanophilous, also colouring in Congo red and acetocarmine, persistent in 40 percent KOH, typically running along the long axis, rarely oblique; spores show no separating layers in heated lactic acid. Asci 300 X 12 μm, I-, apically constricted, apex thickened with a cyanophilous coating, inward thickening central, four-spored, thick-walled, base simple to more frequently bifurcate, sporal part 200 μm. Paraphyses srongly anastomosing below, strongly branched above, 2-3 μm



Figs. 1-6. *Desmazierella piceicola*, scales 50 µm.--1. Paraphyses stained with acetocarmine showing multinucleate cells --2. Spores--3. Ascus apices showing inward thickening and periascus--4. Apothecium, drawn to the appearance in moist condition--5. Ascus bases--6. Ascus tip with two types of paraphyses

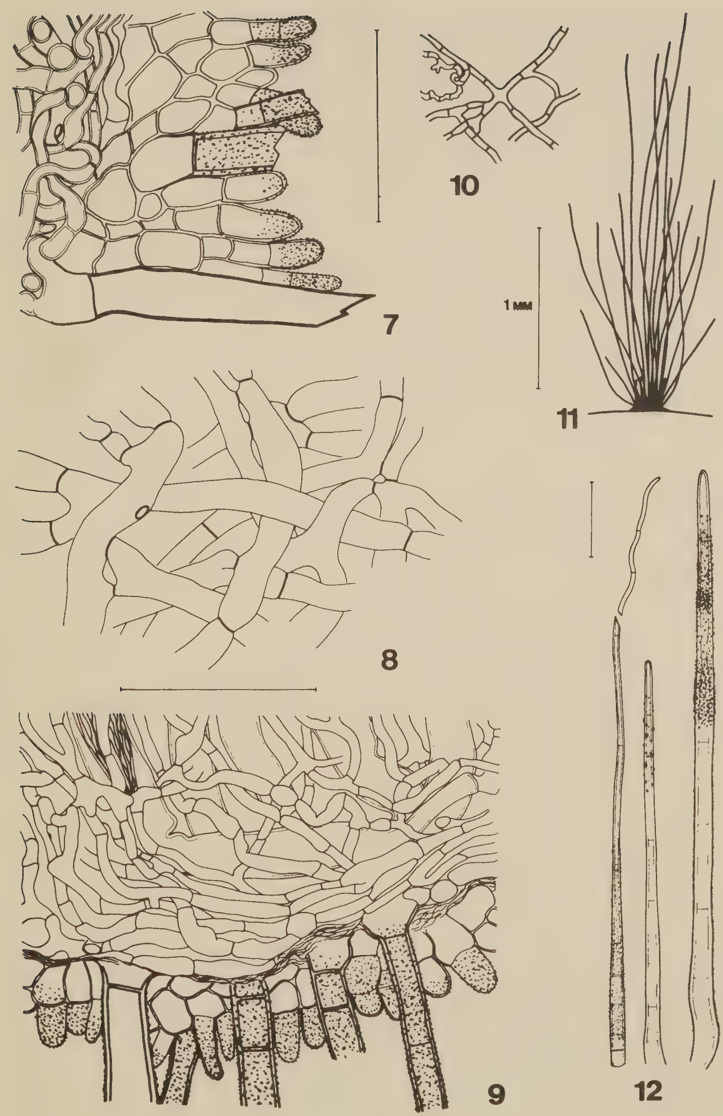
wide, pale brown to hyaline below, always apically brown and granulated, exceeding the asci by 20 µm; some paraphyses more setose, exceeding by 80 µm, dark brown, walls up to 2 µm thick, granulated. Cells of paraphyses multinucleate, the uppermost cells with two to four nuclei, these carminophobic, but rather clearly observable after KOH pretreatment. Spore nuclei not coloured in acetocarmine.

DISCUSSION

In the field one is first led to consider the species as *D. acicola* Lib. The acicolous habit and gross morphology are strikingly similar to this well-known species. Related characters, observed under microscope, are the structurally identical hairs, same excipular structure, similar asci with central inward thickening and forked base, the presence of a short stipe, and above all, the setose paraphyses (Figs. 3-9, 12). Besides the completely different spores, other minor differences are also present. In *D. acicola* the paraphyses have encrusted apices, 100 µm long, the more setose apices being up to 250 µm in length. In present species these measure to 30 µm and 100 µm respectively (Fig. 6). *D. acicola* has a thicker ectal excipulum and the shortest hairs arising from the outermost cells are narrow and long when compared to the broadly cylindrical hairs of our material (Figs. 7, 9).

The huge spores are the most remarkable feature of *Desmazierella piceicola*. Longitudinal, cyanophilous ridges occur only in the genus *Wolfina* Seav. ex Eckbl. The other two genera demonstrating cyanophilous ornamentation are *Galiella* Nannf. & Korf and *Neournula* Paden & Tyl., both of which have warty spores. These genera are, however, not closely related to *Desmazierella*. They are grouped into the tribe Galielleae Korf (1970). The spores of *D. piceicola* are often inequilateral, which is typical of the Sarcoscyphineae Rifai. The ridges are very low and rarely affect the contours; as ridges they can be most clearly observed in deformed spores. Anastomosing is common, but totally transverse ridges and ridges with free ends are rare. Typically, ridges run along the long axis of the spore. The cyanophilous apiculi are constantly present. The asci, showing no traces of abortive spores, are truly four-spored, which is also rare in this suborder.

At first the spore characters, considered to be rare in other Sarcoscyphineae as well as being different from those found in *Desmazierella acicola*, were thought to justify the establishment of a new genus. Later, we learned that the spores of *D. acicola* (ex Herb. Poelt 4316 in UPS) also have a cyanophilous outer layer present in very aged spores. This layer is continuous and very thin. Its presence has not been emphasized before. Whether continuous or not, this cyanophilous layer results in partial similarity of spores between these two species, which differ in many important characters. Thus, they should be grouped in the same genus.



Figs. 7-12. *Desmazierella piceicola*, scales 50 µm.--7. Stipe excipulum showing one opaque hair--8. Medullary excipulum with clearly stained septae--9. Excipulum near the margin --10. Hyphae running on the surface of the needle--11. Hairy outgrowth--12. Hairs

The material examined is characterized also by the seemingly synchronous development of asci, which would be an anomalous character in any group except the tribe Boedijnopezizeae Korf (1970). Both of the two collected apothecia were fully developed with asci in their final stages of development. Only two asci with young spores were observed. Most likely these were the result of occasional aborting. Closer scrutiny of the mature spores revealed different colouring in Melzer's reagent: contents of some spores became yellow, some remained hyaline possibly due to a change in spore wall structure. This indicates at least some variation in ascus maturation. Only additional collections of younger material will conclusively show whether this feature conflicts with present taxonomic treatment of *D. piceicola*.

The taxonomic position of the genus *Desmazierella* has not yet been fully established. The main characters stressed below are number of nuclei, cyanophilous spore ornamentation, setose hairs and ascus development. The classification of Korf (1970, 1973) groups most of these characters. *Desmazierella* belongs to the family Sarcosomataceae Kob., where it is anomalous due to its plurinucleate celled paraphyses (Berthet 1964). The embracement of the present new species to the genus does not change the situation (Fig. 1). Cyanophilous spore ornamentation is restricted to genera of the tribe Galielleae and synchronous ascus development to the tribe Boedijnopezizeae. This classification separates two main characters into different families, namely setose hairs (*Thindia* Korf & Waraitch and *Desmazierella*) and setose paraphyses (*Cookeina* O. Ktze and *Desmazierella*). Korf and Waraitch (1971) cast some doubt on the position of the genus *Desmazierella* and noted its possible relationship to *Thindia*.

Denison (1972) placed *Desmazierella* into the family Sarcoscyphaceae Le Gal ex Eckbl. and described a new tribe, Pithyeae, for temperate species on conifer debris. Other important characters thus combined; i.e. small size, cup-shaped apothecia, terminal operculum and setose hairs. Although *Desmazierella* is again somewhat anomalous due to the lack of bright pigments, Denison's new tribe offers an interesting solution. All species with setose paraphyses would be included in the same family. It may be later shown that *D. piceicola* has synchronous ascus development; this character is already present in Sarcoscyphaceae. Longitudinally striate spores are also more typical to Sarcoscyphaceae than to Sarcosomataceae. The only main character thus separated is the cyanophilous spore ornamentation. But the ornamentation observed in spores of *D. piceicola* is somewhat different from at least that of *Neournula* (in which the warts dissolve in dilute KOH; Paden & Tylutki 1968): the ridges are stable even in 40 percent KOH. This suggests a difference in the nature of the ornamentation. For this reason too, we feel that *Desmazierella* would be best positioned in the tribe Pithyeae of Denison.

Recent studies on the structure of the apical apparatus in Sarcoscyphineae have revealed new taxonomic data for classification. Samuelson et al. (1980) classified the opercula into two groups, which follow recognized families. The opercula of Sarcoscyphaceae are thick to extremely thick (1.2-7.7 µm), while in Sarcosomataceae they are thin (0.5-0.8 µm). In *D. piceicola* the maximal thickness of the apical apparatus, including the cyanophilous layer which most likely corresponds with the periascus (cf. e.g. van Brummelen 1978), is 2-3 µm. Although the inward thickening is not oblique in orientation, the apical apparatus seems to be closely related to that of other sarcoscyphaceous genera. In addition to the apical thickening, the ascus wall shows greater thickness in the regions adjacent to the operculum and near the subapical constriction (Fig. 3).

The needle was also occupied by hairy outgrowths, the nature of which is somewhat uncertain (Fig. 11). They develop from agglomerations of brown, 2 µm wide, densely septate, somewhat thick-walled (0.5 µm), branching hyphae running along the needle surface (Fig. 10). The blackish brown hyphae are usually smooth, thick-walled, septate and occasionally reach a length of 3 mm. When not occurring in clusters they are clearly shorter and not far from those of certain hyphomycetous genera.

In all, *Desmazierella piceicola* is a surprising species easily recognized under microscope. Its autumnal occurrence is noteworthy, but it is not necessarily typical since some vernal sarcoscyphineous species can also be encountered during the autumn.

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GRISEOPORIA A NEW GENUS FOR *HEXAGONIA CARBONARIA* (POLYPORACEAE)

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SUMMARY

Griseoporia is characterized by an effuse, poroid basidiome with a brown context, narrow generative hyphae with clamp connections, narrow skeletal hyphae and rather large, typically allantoid spores with smooth, thin, hyaline, nonamyloid walls.

During the study of the North American species of the Polyporaceae it became evident that several species were taxonomically misplaced. One such species is *Hexagonia carbonaria* Berk. et Curt. The combination of features which characterizes this fungus is not accommodated in any other genus and, therefore, a new generic name is proposed.

GRISEOPORIA Ginns, nov. gen.

Fructificatio resupinata, raro pileata, poris griseis, magnis. Systema hypharum dimiticum. Hyphae generatoriae fibulatae. Sporae magnae, allantoideae, raro cylindricae, pariete levi, tenui, hyalino, nonamyloideo. Species typicae: *Hexagonia carbonaria* Berk. et Curt., Grevillea 1: 68. 1872. Etymology: griseus - from the grey lining of the pores; poria - from the general usage for resupinate polypores. Gender: feminine.

Basidiomes effuse, rarely narrowly pileate. Pores grey, 1-3 per mm. Context to 1 mm thick, distinctly brown. Generative hyphae narrow with clamp connections. Skeletal hyphae narrow. Basidiospores allantoid, rarely cylindrical, rather large, the spore wall smooth, thin, hyaline, nonamyloid, acyanophilous.

A combination of features distinguishes this genus from other genera of the Aphyllophorales: (a) the poroid hymenophore, (b) the brown context which does not permanently stain in KOH, (c) the presence of clamp connections, and (d) the rather large, allantoid to cylindrical, nonamyloid spores. Additional features of the type species which seem to be of taxonomic importance at the generic level are the narrow, yellow skeletal hyphae and the association with a brown rot of coniferous wood.

GRISEOPORIA CARBONARIA (Berk. et Curt.) Ginns, comb. nov.
≡ *Hexagonia carbonaria* Berkely et Curtis, Grevillea 1: 68. 1872 (basionym); *Fuscoporia c.*, Murrill, N. Amer. Flora 9: 4. 1907; *Trametes c.*, Overholts, Mycologia 23: 126. 1931; *Poria c.*, Baxter, Pap. Mich. Acad. Sci., Arts, Lett. 17: 425. 1933; *Coriolellus c.*, Bondartsev et Singer, Ann. Mycol. 39: 60. 1941.
= *Trametes sequoiae* Copeland, Ann. Mycol. 2: 507. 1904, fide Overholts 1931, 1953; Lowe 1942, etc.; *Coriolellus s.*, Murrill, N. Amer. Flora 9: 29. 1907.

Habitat and distribution: Infrequent, on gymnosperm wood, i.e., *Cedrus deodora, Chamaecyparis lawsoniana, Larix laricina, L. occidentalis, Picea engelmannii, Pinus banksiana, P. excelsa, P. monticola, P. ponderosa, P. strobiformis, P. taeda, P. wallichiana, Pseudotsuga menziesii, Sequoia sempervirens, Thuja occidentalis, T. plicata,* on charred logs or branches, rarely on noncharred wood, associated with a brown rot. Lowe 9913 was the only collection seen which was not associated with charred wood and a rather large piece of the wood had been included in the collection. Collected in USA (New York, Tenn., S. Car., Geo., Fla., Ala., Missouri, Mich., S. Dak., Mont., Idaho, Wash., Ore., Calif., Ariz., N. Mex.), Canada (Ont., Man., B.C.) and India (Himalayas). The preceding data was taken from collections cited and in Bakshi (1971: 163), Baxter (1934), Gilbertson et al. (1974), Lowe & Gilbertson (1961, 1961a), Martin & Gilbertson (1978), Overholts (1953: 153) and Stalpers (1978). Neither Donk (1974), Ryvarden (1978) nor Stalpers (1978) knew the species from Europe thus Bakshi's (1971) compilation seems to be in error.

Specimens critically examined: Canada: Man.: 20 km east of Beausejour, 15 Sept. 1935, on charred *Pinus banksiana* log, G.R. Bisby (DAOM 10063); B.C.: Oyster River, 17 Sept. 1938, on charred conifer log, W. Touzeau (DAOM 8432). USA: Ariz.: Coronado Nat. For., on conifer stump, J. Lowe 9913 (K); S. Car.: on charcoal and burnt twigs (of conifer, J.G.), No. 2466, type (K); Wash.: San Juan Is.: Friday Harbor, on burnt log, Harper 1198 (S) and N. Amer. (perhaps Idaho, J.G.), in ligno carbonario *Laricis occidentalis*, Dr. Weir, script Bresadola (K). India: Himalayan forest, on burnt stump of *Cedrus deodora*, 1953, K. Bagchee K/181 (DAOM 30507).

Detailed descriptions and illustrations of basidiomes appeared in Overholts (1953: 152), Gilbertson (1961, 1974), and Lowe (1942: 91). The large pores (1-3 per mm) can be round, angular, pentagonal or elongated (Fig. 1), and are not as uniformly hexagonal as some descriptions imply. The grey lining of the pores is striking. In addition the distinctly brown tissues, the association of basidiomes with a brown rot of coniferous wood and their occurrence on charred wood combine to distinguish this species in the field. The spores (7-9.6 X 3-3.5μm) in

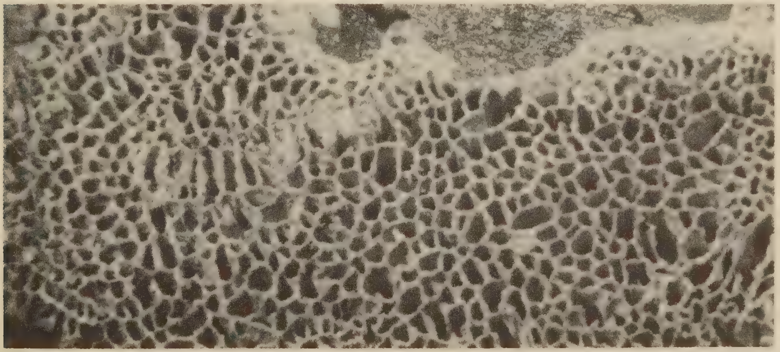

Fig. 1. *Griseoporia carbonaria*. Hymenial surface. DAOM 10063. Scale equals 5 mm.

face view were cylindrical with broadly rounded ends (Fig. 2). In profile the ends were broadly rounded, the abaxial surface was typically distinctly convex but in some spores it was nearly straight, whereas the adaxial surface was always concave albeit sometimes very slightly so.

The spore, basidial and hyphal walls were acyanophilous, although the cytoplasm stained intensely blue. In Melzer's reagent there were neither amyloid nor dextrinoid reactions.

Culture characters: Mat, after two weeks incubation on 1.25% malt agar at 25C, 4.1-4.5 cm in radius, white with tinge of cream color over the older part. Advancing zone even with raised aerial mycelium extending to the limit of growth. The outer half of the mat composed of erect, cottony growth which was slightly less abundant surrounding the inoculum. Radiating from the inoculum were lines of compact mycelial growth which were appressed to the agar and covered by the aerial mycelium. The agar was neither stained nor bleached. After 6 weeks of incubation the mat had grown across the 9 cm petri dish and it was yellow to pale brown (Munsell 2.5Y8/4-6 to 10YR7/8). The older part of the mat was slightly raised, woolly and the newer growth although similar had narrow zones of slightly thicker raised growth which were compact and opaque. The mycelium had grown up the side of the petri dish to the lid. At 6 weeks the agar had darkened slightly in color. The odor was slightly sweet at 2 and 4 weeks.

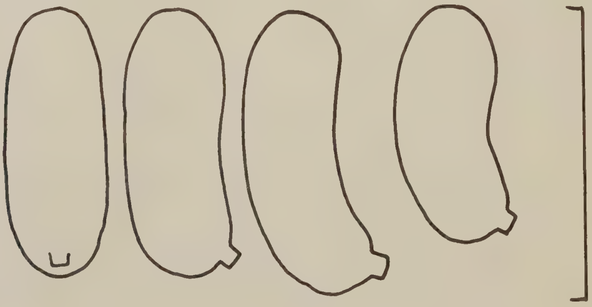

Fig. 2. *Griseoporia carbonaria.* Basidiospores. DAOM 10063. Scale equals 10μm.

Tests for laccase and tyrosinase were all negative. Drops of five reagents were placed at several points on mycelial mats. The reagents were syringaldazine (Harkin et al. 1974), and guaiacol, gum guaiacum, p-cresol and tyrosine (Käärik 1965: 15). Two additional tests were performed using tannic acid agar and gallic acid agar (Nobles 1965: 1099).

Hyphae of the advancing zone hyaline, thin-walled, with clamp connections, 2.2-3.1µm diam. Clamp connections infrequent because the cells were long. Branches arose at and between septa. Aerial hyphae as in the advancing zone but due to the shorter cells there were more clamp connections and branches. After 2 weeks of incubation skeletal hyphae had begun to develop and were rarely branched, pale yellow, thick-walled, 1.0-1.5µm diam. At 4 weeks the mat was composed primarily of skeletal hyphae which were very rarely branched, 1.5-2.2µm diam and had the walls thickened (no lumen visible) and refractive with a slight yellow color. No special cells or conidia seen.

Species code (Nobles 1965): 1.3.8.32.37.38.44-45.55.

Cultures studied: DAOM 8432 and DAOM 30507.

The cultural characters of *G. carbonaria* have appeared in Bakshi et al. (1970), Nobles (1958, 1971) and Stalpers (1978). Although Nobles incorporated salient features of *G. carbonaria* in two keys she never published a detailed description for the species. Nobles (1958) presented a phylogenetic scheme for the Polyporaceae based on the use of cultural characters. *G. carbonaria* (as *Trametes c.*) appeared in an isolated position and its uniqueness drew the comment (p. 899) that *G. carbonaria* "differs from all other species examined". Subsequently Gilbertson (1961: 7) studying basidiomes of *Trametes* species commented that "*Trametes carbonaria* does not show a close relationship to any other species included here." Nobles (1971: 179) grouped "*Trametes*" *carbonaria* (her quotes) with several species of *Gloeophyllum*. She commented (p. 190) that cultures of "*T.*" *carbonaria* had been compared with *Coriolellus* species and it was "deliberately omitted ... from *Coriolellus* because the cultures lacked the thick-walled, nodose-septate hyphae that were present in all species of *Coriolellus*."

Gloeophyllum Karst. (including the poroid species often segregated in *Osmoporus* Singer) has basidiomes with several features in common with *Griseoporia*. Both genera have rather large, hyaline spores, brown tissues, a dimitic hyphal system and an association with a brown rot of coniferous wood. However, *Gloeophyllum* is distinct in having a lamellate hymenium or if the hymenium is poroid then the basidiomes are pileate. In addition *Gloeophyllum* species have brown tissues which stain black in KOH, the spores are cylindrical, the hyphae (both skeletal and generative) are relatively broad and cystidia or cystidioles are found in all species. Despite similarities in some features I do not feel that *Griseoporia* is closely related to *Gloeophyllum* and there are no other species in the North American mycoflora that appear closely allied to it.

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LES ESPECES SANCTIONNEES DU GENRE EUTYPA (DIATRYPACEAE, ASCOMYCETES) ETUDE TAXONOMIQUE ET NOMENCLATURALE

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Résumé

Le matériel original ou authentique des espèces sanctionnées par Fries et transférées au genre **Eutypa** a été examiné. Les espèces suivantes, maintenues dans ce genre, sont typifiées et décrites: **E. sparsa** (bas. **Sphaeria eutypa**), **E. maura** (syn. **E. acharii**), **E. lata** avec **E. armeniacae** comme synonyme important, **E. lejoplaca** (syn. **E. prorumpens**), **E. flavovirens**, **E. leprosa** (syn. **E. ludibunda**) et **E. spinosa**. La combinaison nouvelle **Cryptosphaeria subcutanea** (syn. **E. vicinula**, **E. salicicola**, **Anthostoma ontariensis**) est proposée. **S. aneirina** est un synonyme de **C. populina**. **S. subtecta** appartient au genre **Cryptovalsa**. **S. systoma** et **S. crustata** (syn. **E. cyclospora**), n'appartiennent pas au genre **Eutypa**. **S. viticola** et **S. dissepta** ne sont pas des **Diatrypacées**. Aucun type n'a été trouvé ou proposé pour **S. scabrosa** et **S. oppansa**.

Summary

Authentic or original material of the sanctioned species of the genus **Eutypa** has been examined. The following species have been accepted, described and typified: **E. sparsa** (bas. **Sphaeria eutypa**), **E. maura** (syn. **E. acharii**), **E. lata** with **E. armeniacae** as important synonym, **E. lejoplaca** (syn. **E. prorumpens**), **E. flavovirens**, **E. leprosa** (syn. **E. ludibunda**), **E. spinosa**. The new combination **Cryptosphaeria subcutanea** (syn. **E. vicinula**, **E. salicicola**, **Anthostoma ontariensis**) is proposed. **S. aneirina** is a synonym of **C. populina**. **S. subtecta** belongs to the genus **Cryptovalsa**. **S. systoma** and **S. crustata** (syn. **E. cyclospora**) do not belong to the genus **Eutypa**. **S. viticola** does not belong to the **Diatrypaceae**. No type has been found or proposed for **S. scabrosa** and **S. oppansa**.

Cette publication entre dans le cadre de la préparation d'une thèse de doctorat à l'Université de Lausanne.

1 INTRODUCTION

La détermination d'une espèce du genre Eutypa Tul. n'est actuellement possible qu'en ayant recours à des ouvrages anciens qui délimitent les espèces de façon peu claire, et véhiculent surtout des confusions, tant taxonomiques que nomenclaturales. Des espèces bien définies, spécifiquement liées à une plante hôte sont souvent connues sous des noms illégitimes. Si l'on considère E. armeniacae, pathogène ubiquiste donnant lieu à une importante littérature phytopathologique, la confusion est encore plus grande.

Cet état de fait justifie, à mon sens, la publication de ce travail intermédiaire traitant de toutes les espèces sanctionnées par Fries (1823), et validement transférées depuis dans le genre **Eutypa**. Cependant E. **ulicis** (Fr.:Fr.) Sacc. et E. **aulacostoma** (Kunze ex Fr.:Fr.) Sacc., publiés par Fries dans Linnea 5 (1830) et cités dans l'index du Systema 3, également sanctionnés (Gams, 1983), seront traités ultérieurement.

La préparation du matériel d'herbier a été décrite précédemment (Rappaz, 1983). Alternativement au gel de Sorbitol-Gélatine, le milieu de Hoyer (voir Alexopoulos et Beneke, 1962) a été utilisé. Les cultures, plurispores, ont été faites sur de l'agar malté (2%) aux conditions de lumière et température ambiantes. Lorsque cela s'est avéré nécessaire, les plantes hôtes ont été déterminées à l'aide des clefs xylotomiques de Greguss (1959) et de Schweingruber (1978).

La coloration bleu noir de l'anneau apical des asques dans une solution iodo-iodurée est notée par I+, l'absence de coloration par I-.

En ce qui concerne les citations des synonymes, j'ai utilisé la notation introduite par Kohn (1979): (!!) lorsque du matériel original a été observé, (!) pour du matériel authentique.

Dans les citations du matériel examiné, les collections où le nom du collecteur est omis sont celles que j'ai récoltées. A celles qui sont déposées dans mon herbier correspond le numéro de récolte donné entre parenthèses. Lorsque celles-ci sont nombreuses, la localité et la date de récolte ne sont pas mentionnées.

2 ESPECES SANCTIONNEES ET ACCEPTEES DANS LE GENRE EUTYPA

La clef ci-dessous se propose de mettre en évidence les caractères séparant les espèces sanctionnées et acceptées dans le présent travail, plutôt que d'être utilisée comme clef de détermination, toutes les espèces décrites par les auteurs postérieurs à Fries ne s'y trouvant pas.

1 Longueur moyenne des ascospores inférieure à 7 µm.
Anneau apical I+ petit, ou anneau apical I-.
Stroma se développant dans le bois.
Ostiole profondément fendu ou cruciforme.

2 Longueur moyenne des conidies comprise entre 20 et 25 µm.
Anneau apical I+, petit.
Bois noirci superficiellement.
Sur des espèces du genre Populus.
Eutypa sparsa.

2* Longueur moyenne des conidies comprise entre 13 et 17 µm.
Anneau apical I-.
Bois noirci superficiellement et en profondeur.
Sur Acer pseudoplatanus.
Eutypa maura.

1* Longueur moyenne des ascospores supérieure à 7 µm.
Anneau apical I+.
Stroma se développant dans le bois ou dans l'écorce.
Ostiole entier, sillonné, fendu ou cruciforme.

2 Longueur moyenne des ascospores inférieure à 11 µm.

3 Stroma peu développé, non coloré en vert.

4 Ostiole entier ou sillonné.
Longueur moyenne des ascospores supérieure ou égale à 8 µm.
Anneau apical I+.

5 Longueur moyenne des conidies supérieure à 25 µm.
Eutypa lata.

5* Longueur moyenne des conidies inférieure à 25 µm.
Eutypa lejoplaca.

4* Ostiole fortement émergent,
profondément fendu ou cruciforme.
Anneau apical I+, bien visible.
Longueur moyenne des ascospores inférieure à 8 µm.
Eutypa spinosa.

3* Stroma développé, coloré en vert ou jaune vert.
Eutypa flavovirens.

2* Longueur moyenne des ascospores supérieure à 11 µm.
Ostiole profondément fendu à cruciforme.
Eutypa leprosa.

1 Eutypa sparsa Romell, Bot. Not., p. 177 (1892)
Sphaeria eutypa Fr.:Fr., Syst. mycol. 2:478 (1823) (!)
Valsa eutypa (Fr.:Fr.) Nits., Pyren. Germ. p.130 (1867)
Kalmusia eutypa (Fr.:Fr.) Sacc., Syll. fung. 9: 823 (1891)
Sphaeria operculata Pers. non Alb. & Schw.:Fr.,
Syn. meth. Fung., p. 80 (1801) (!)

Stroma: étendu, se développant dans le bois, ne soulevant pas la surface, la noircissant parfois fortement; le bois n'est pas modifié entre les périthèces. Ostioles: émergents à proéminents, coniques ou rectangulaires, trapus, profondément fendus à cruciformes. Périthèces: disposés sur un rang, régulièrement espacés, sphériques, d'un diamètre variant entre 200 et 400 (450) µm., peu profondément enfouis dans le bois. Asques: (fig. 1a) avec un pédicelle de longueur variant entre 20 et 50 µm. Pars spor. mesurant 20 - 40 x 4.5 - 6.5 µm. Anneau apical I+, petit. Ascospores: (fig. 1b) jaune pâle, allantoïdes, mesurant 5 - 7.5 x 1.2 - 1.5(1.8) µm., les moyennes des longueurs du matériel étudié variant entre 6.0 et 6.8 µm. Conidies: peu à moyennement courbées, mesurant 17 - 28 x 1 - 1.5 µm., les moyennes des longueurs du matériel étudié variant entre 21.2 et 25 µm.

Matrix: bois mort et décortiqué de Populus tremula L., P. alba L., trouvé une fois sur Salix sp.

Spécimen type: Persoon, sous S. operculata β aspera et S. eutypa Fries (L: herb. Lugd. Bat. 910269-137, proposé comme NEOTYPE)

MATERIEL EXAMINE: Australie: Bolay, 18-9-1983, Populus alba, Mt. Bold Reservoir, Dam (379). **France:** 9-5-1983, P. alba, St-Jean de Cuculles, Hérault (335). **République Fédérale Allemande:** Sydow, 7-6-1908, Populus tremula, Brandenbourg (LAU). **Suède:** Romell, Populus tremula (S: herb. Bresadola 393). **Suisse:** Bolay, Juin 1983, P. tremula, Réchy (353); 14-3-1981, Salix sp., le Mont Pélerin (36); 12-6-82, P. tremula, Champ Pittet (255, 259-261).

Le matériel de Fries déposé à UPS ne correspond pas du tout à l'espèce décrite ici, en particulier Scl. Suec. exs. 15 qui est un bituniqué dictyosporé. C'est probablement pour cette raison que Saccardo (1891) a publié **Kalmusia eutypa** (Fr.:Fr.) Sacc. La conception de S. **eutypa** dans le sens proposé par Saccardo, bien qu'elle soit possible, ne correspond pas au sens dans lequel ce nom est accepté habituellement. En effet, S. **eutypa** a toujours été utilisé pour des Diatrypacées. Par les frères Tulasne (1863) d'abord, comme synonyme de E. **acharii**, par Romell (1892) ensuite, qui propose E. **sparsa** comme un nomen novum pour S. **eutypa** L'acceptation de ce nom dans le sens de Romell conduit donc à considérer **Kalmsusia eutypa** comme un synonyme nomenclatural de E. **sparsa**.

Les collections de Persoon de S. **operculata** présentent un mélange de plusieurs espèces différentes, et l'on y trouve aussi bien E. **sparsa** que E. **maura**. Néanmoins, la description originale de S. **eutypa**, par la mention de Populus comme substrat et de "collo brevi", caractérise bien cette espèce et ne peut s'appliquer à E. **maura** décrit ci-dessous. D'une même façon, la description de S. **maura** met bien en évidence les caractéristiques morphologiques du stroma de l'espèce, et, le matériel original de cette dernière ayant pratiquement une valeur d'holotype, il est possible de la typifier sans hésiter. Ainsi, malgré la confusion existant dans les herbiers ou dans la littérature, les descriptions originales et le matériel qui leur est associé permettent d'attribuer à chacune des deux espèces le nom qui lui revient.

Le matériel proposé comme néotype pour E. **sparsa**, bien que dépourvu d'asques et d'ascospores, correspond au protologue par la morphologie du stroma et par la disposition des périthèces. De plus, bien que le substrat de cette collection ne soit pas mentionné, la structure du bois montre qu'il s'agit de Populus. J'accepte donc la conception qu'a Romell (1892) de S. **eutypa**, et cette espèce étant bien caractéristique, je n'estime pas nécessaire que le néotype soit particulièrement bien développé.

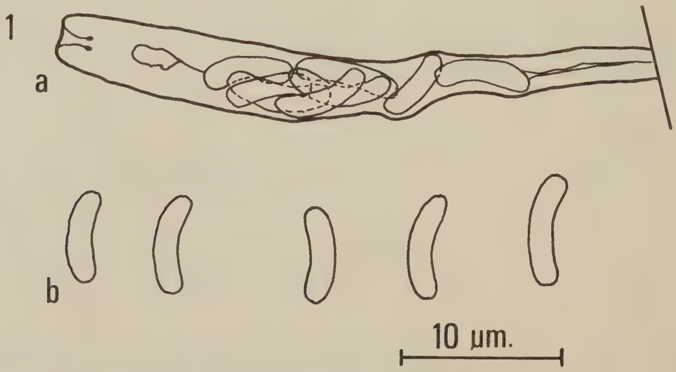

FIG. 1. **Eutypa sparsa**. (Rappaz 259). a. Asque avec un anneau apical I+. b. Ascospores.

Fries (1823) cite **Lichen eutypus** Ach. (Acharius, 1798) comme basionyme pour S. **eutypa**. Bien que je n'aie pas observé de matériel de Acharius, la mention de Fraxinus comme unique substrat dans le protologue de L. **eutypus** indique que cette dernière est différente de S. **eutypa** tel qu'il est circonscrit ici. Il est donc préférable de citer S. **eutypa** Fr.:Fr., plutôt que S. **eutypa** Ach.:Fr.

Valsa eutypa est un synonyme nomenclatural de S. **eutypa**. Cependant la conception que Nitschke avait de cette espèce correspond plus à E. **maura** qu'à E. **sparsa**.

2 **Eutypa maura** (Fr.:Fr.) Sacc., Syll. Fung. 1:166 (1882)
Sphaeria maura Fr.:Fr., Syst. mycol. 2: 370 (1823) (!!)
Valsa maura (Fr.:Fr.) Nits., Pyren. Germ. p. 133 (1867)
Sphaeria decomponens Sow., Engl. Fung. 2(17): 91 (1799) (!)
Eutypa acharii Tul. Sel. Fung. carp. 2:53 (1863) non S. eutypa Fr.

Stroma: étendu, se développant dans le bois, ne soulevant pas la surface, la noircissant, recouvert d'un ectostroma parfois conidiogène et déhiscent dans la vétusté, qui pourrait intervenir dans le décollement de l'écorce pendant le développement des périthèces. Cet ectostroma présente souvent des striations caractéristiques qui seraient dues à des rongeurs (Bevan & Greenhalgh, 1983). Le bois est noirci entre les périthèces, ces derniers étant cependant entourés d'une fine couche de bois non coloré. **Ostioles**: émergents à proéminents, coniques ou rectangulaires, trapus, profondément fendus à cruciformes. **Périthèces**: disposés sur un rang, régulièrement espacés, parfois rapprochés, sphériques, d'un diamètre variant entre 300 et 600 µm., enfouis dans le bois, leurs bases étant situées à une profondeur variant entre 450 et 650 µm. **Asques**: (fig. 2a) avec un pédicelle de longueur variant entre 15 et 40 µm. Pars spor. mesurant 15 - 30 x 5 - 7 µm. Anneau apical I-. **Ascospores**: (fig. 2b) jaune pâle, allantoïdes, mesurant 4.5 - 7 x 1.2 - 1.5 (1.8) µm., les moyennes des longueurs du matériel étudié variant entre 5.2 et 6.7 µm. **Conidies**: droites ou peu courbées, mesurant 9-18 (20) µm. les moyennes des longueurs du matériel étudié variant entre 13.4 et 16.4 µm.

Matrix: sur bois mort et décortiqué d'Acer pseudoplatanus L. Espèce très fréquente sur A. pseudoplatanus dont la distribution est probablement liée à celle de la plante hôte.

Spécimen type: Schmidt & Kunze exs. 128 (UPS: Deuts. Schwämme 128, sous Sphaeria lata β glebulosa Pers., proposé comme LECTOTYPE).

MATERIEL EXAMINE: **Angleterre**: Sowerby, 7-10-1796, Kensington Garden, London, (K: English Fungi 217, sous S. **decomponens** Sow.). **France**: Mougeot, ligno emortuo, Vosges, ex herb. Pers. (L: Herb. Lugd. Bat. 910269-140, sous **Sphaeria operculata**); Eperjes, oct. 18??, A. pseudoplatanus (PC: Herb. Quélet 1198, sous E. **acharii**). **Suède**: Fries, (UPS: Herb. Fries, sous **Sphaeria eutypa** b.). **Suisse**: Acer pseudoplatanus (2, 13a, 17, 41b, 58, 60b, 67, 152, 345). **Tchécoslovaquie**: Petrak, 20-8-1912, Acer pseudoplatanus, Mährig-Weisskirchen (LAU: sous E. **acharii**); Petrak, 16-8-1912, "Fagus sylvatica", Mährig-Weisskirchen (LAU: sous E. **milliaria**); **Europe**: Kunze, ad truncos vetust. decorticatos, ex herb. Pers. (L: Herb. Lugd. Bat. 910269-135, sous S. **operculata**).

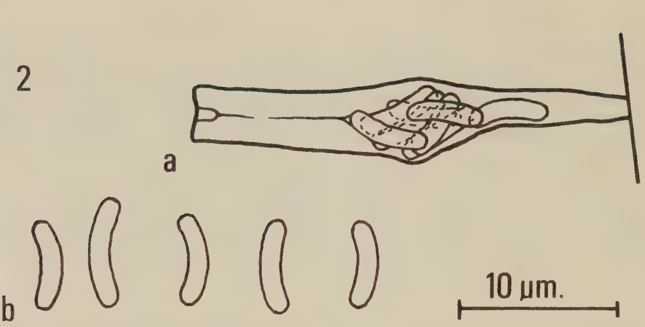

FIG. 2. **Eutypa maura**. (Rappaz 2). a. Asque sans anneau apical I+. b..Ascospores.

Dans le protologue de S. **maura**, Fries ne cite que l'exsciccata de Schmidt & Kunze n. 128 dont la collection déposée à UPS est proposée comme lectotype. Ce matériel correspond au protologue et de plus, la structure du bois montre que le substrat est de l'érable. Bien que ce matériel soit dépourvu d'asques et d'ascospores, la morphologie du stroma et la plante hôte ne laissent aucun doute quant à l'identité de S. **maura** avec E. **acharii**, cette dernière espèce étant illustrée et décrite très clairement par les frères Tulasne. En effet, et bien qu'apparement aucun matériel original ou authentique de E. **acharii** ne se trouve à PC, la description originale ainsi que la spécificité pour A. pseudoplatanus suffisent à caractériser cette espèce. L'inclusion de S. **eutypa** dans la synonymie de E. **acharii** était une erreur de la part des Tulasne, mais cette confusion remonte à Fries lui-même qui cite S. **decomponens** sous S. **eutypa**, la planche de Sowerby pouvant effectivement prêter à confusion. Le matériel de Sowerby ne laisse par contre aucune hésitation quant à l'identité de S. **decomponens** avec S. **maura**. La description des Tulasne n'empêchera pas Nitschke de perpétuer cette confusion, en donnant des indications qui vont induire en erreur les mycologues qui le suivent, jusqu'à Berlese (1902). Ce dernier, en effet, publie E. **sparsa** comme une nouvelle espèce de Romell, donne pour E. **acharii** une illustration qui ne rappelle que peu l'espèce décrite par les Tulasne, et mentionne enfin Prunus spinosa comme plante hôte pour E. **maura** (à la suite de Nitschke), tout en illustrant cette dernière espèce assez fidèlement.

3 **Eutypa lata** (Pers.:Fr.) Tul., Sel. Fung. carp. 2:56 (1863)
Sphaeria lata Pers.:Fr., Syst. mycol. 2: 369 (1823)
Sphaeria lata Pers. Obs. mycol. 1: 66 (1801) (!)
Valsa lata (Pers.:Fr.) Nits., Pyren. Germ. p. 141 (1867)
Sphaeria papillata Hoffm., Veg. Crypt.:19 (1787) fide Fries
Sphaeria fuliginosa Sow., Eng. Fung.: 157 (1803) fide Fries (!)
Sphaeria milliaria Fr.:Fr., Syst. mycol.2:370 (1823) (!!)
Valsa milliaria (Fr.:Fr.) Nits., Pyren. Germ., p.149 (1867)
Eutypa milliaria (Fr.:Fr.) Sacc., Syll. Fung. 1: 175 (1882)

Valsa mauroides Nits., Pyren. Germ., p.151 (1867) (!!)
 Eutypa mauroides (Nits.) Sacc., Syll. Fung. 1: 173 (1882)
Valsa fraxini Nits., Pyren. Germ., p. 145 (1867) (!!)
 Eutypa fraxini (Nits.) Sacc., Syll. Fung. 1: 174 (1882)
Valsa rhodi Nits., Pyren. Germ., p.148 (1867) (!)
 Eutypa rhodi (Nits.) Sacc., Syll. Fung. 1:176 (1882)
Valsa myriocarpa Nits., Pyren. Germ. p.159 (1867) (!!)
 Cryptosphaeria myriocarpa (Nits.) Sacc., Syll. Fung. 1: 183 (1882)
Eutypa ambigua J.C. Kunze ex Sacc., Syll. Fung. 1: 176 (1882) (!!)
Cryptosphaeria crepiniana Sacc. & Roum.,
 Revue de mycologie 1: 233 (1883) (!!)
Eutypa lata var. rimulosa Sacc., Ann. mycol. 12: 288 (1914) (!!)
Eutypa lata var. ribis Barthelet, Ann. Ep. Phyt. 4(3): 508 (1938)
Eutypa armeniacae Hansf. & Carter in Carter,
 Aust. J. Bot. 5:22 (1957) (!!)

Stroma: étendu, se développant dans le bois ou dans le parenchyme cortical. Dans le bois: soulevant la surface, en bosses parfois confluentes, ou en plaques plus étendues, la noircissant plus ou moins. Dans l'écorce: recouvert ou non du périderme suivant la plante hôte, soulevant et noircissant plus ou moins la partie supérieure du parenchyme, parfois limité par une zone nécrosée linéaire. Bois ou parenchyme cortical peu modifié, rarement noirci entre les périthèces. **Ostioles**: peu émergents à proéminents, arrondis-globuleux ou coniques, entiers, sillonnés ou finement fendus. **Périthèces**: disposés sur un (rarement deux) rang, rapprochés ou en contact, parfois comprimés les uns contre les autres, sphériques à ovoïdes, d'un diamètre variant entre 250 - 700 µm., enfouis dans le bois ou dans l'écorce, leurs bases étant situées à une profondeur variant suivant la plante hôte et l'âge du stroma. **Asques**: (fig.3a) avec un pédicelle de longueur variant entre (50) 65 - 130 µm. Pars spor. mesurant 30 - 60 (75) x 5 - 7.5 µm. Anneau apical I+. **Ascospores**: (fig.3b) jaune pâle, allantoïdes, mesurant (6) 6.5 - 11 (12) x (1.5) 1.8 - 2 (2.2) µm., les moyennes des longueurs du matériel étudié variant entre (7.5) 8 -9.8 (10) µm. **Conidies**: le plus souvent moyennement courbées, mesurant 20 - 36 (45) µm., les moyennes des longueurs du matériel étudié variant entre (22) 25 - 35 µm.

Matrix: sur bois mort de feuillus.

Spécimen type: Rappaz (276a), 11-9-1982, Tilia sp., Les Chênaies sur Villeneuve, VD, Suisse (L: sous E. lata, proposé comme NEOTYPE).

Plante hôte du basionyme: Tilia sp.

Plantes hôtes des synonymes: Fagus sylvatica L. (E. **milliaria**); Salix fragilis L. (E. **mauroides**); Fraxinus excelsior L. (E. **fraxini**); Rosa sp. (E. **rhodi**); Prunus sp. (**Valsa myriocarpa**); Spirea ulmifolia Scop. Syn. S. chamaedryfolia L. (E. **ambigua**); Crataegus sp. (C. **crepiniana**); Prunus armeniaca L. (E. **armeniacae**).

MATERIEL EXAMINE: Angleterre: Dennis, 24-10-1972, Rodel, Isle of Harris, Hebrides (K); Dennis, 9-5-1976, Loch Tralomong, Isle of Harris (K). **Australie:** Bolay, environs d'Adélaïde, sept.-oct. 1983, Gmelina leichardtii (381), Crataegus sp. (376), Cissus hypoglauca (386), Cotoneaster glaucophylla (388), Cotoneaster pannosa (397), Cydonia oblonga (398), Diospyros kaki (391), Eriobotrya japonica (399), Jasminum mesnyi (394), Juglans regia (393), Lantana chelsa (382), Nerium oleander (384), Pittosporum undulatum (367,370), Platanus orientalis (395), Populus italica (400), Prunus amygdalus (385), Quercus suber (392), Rhamnus alaternus (396), Rosa sp. (375), Schinus molle (378), S. terebinthifolius (389), Symphoricarpos orbiculatus (372), Viburnum tinus (383, 390), Vitis vinifera (369); Carter, 16-12-54, Adelaïde, Prunus armeniaca (IMI: 58766, sous E.

armeniacae); Carter, 17-3-1955, Muriootpa, Prunus armeniaca (WARI: 4987, sous **E. armeniacae**, HOLOTYPE); Carter, mars 1971, Glen Osmond, P. armeniaca (herb. Sta. fed. Changins). **Belgique**: Roumeguère, Malmedy, Ardenne, Melia azedarach (PAD: herb. Sacc. 23, sous **Cryptosphaeria crepiniana**, LECTOTYPE); **France**: avr. 1982, Acer campestre, Bissy/Uxelles, Saône & Loire (226, 233); avr. 1982, Carpinus betulus, idem (230, 231, 303); mai 1983, Crataegus sp., le Larzac, Hérault (341); juil. 1981, Genista sp., Levans, Alpes-maritimes (174); juil. 1981, Pistacia lentiscus, Contes/Nice, Alpes-maritimes (169a); mai 1983, P. terebinthus, Pic St.-Loup, Hérault (327); avr. 1983, Ribes sanguinea, Pornic, Loire Atlantique (323). **République Démocratique Allemande**: Auerswald, Salix sp., Leipzig (LAU: sous **E. lata**). **République Fédérale Allemande**: Adi, 15-4-1933, Cornus sanguinea, Bayern (ZT: sous **E. lata**); Fuckel (B: fungi rhen. 908, sous **V. rhodi**); Kirchstein, avr. 1942, Salix sp., Krossbenhitz, Brandenbourg (B: sous **Valsa mauroides**); Kirchstein, 5-3-1916, Rosa sp., Kalkberge, Brandenbourg (B: sous **V. rhodi**); Kirchstein, 25-5-1917, Rosa sp., idem (B: sous **V. rhodi**); Kunze, avr. 1875, Spirea ulmifolia Scop., Bornstedt/Eisleben (L: Fung. exs. 152, sous **E. ambigua**, LECTOTYPE); Nitschke, sept. 1865, Fraxinus excelsior, Nienberge bei Münster (B: herb. Nits., sous **Valsa fraxini**, LECTOTYPE); Nitschke, août 1866, Fraxinus excelsior, Cappenberg, Westfalen (B: herb. Nits., sous **V. fraxini**); Nitschke, mai 1864, Rosa sp., Erdmannshof, Münster, Westfalen (B: herb. Nits., sous **V. rhodi**, NEOTYPE); Nitschke, mars 1865, Rosa canina, Jägerhauschen, Münster, Westfalen (B: herb. Nits., sous **V. rhodi**); Nitschke, avr. 1865, Lohaus-Häuschen, Münster, Westfalen (B: herb. Nits., sous **V. rhodi**); Nitschke, juin 1866, Salix fragilis, Münster, Westfalen (B: herb. Nits. sous **V. mauroides**, LECTOTYPE); Sollman, Salix sp., Coburg (B: herb. Nits., sous **V. mauroides**); Nitschke, oct. 1865, Fagus, Nienberge bei Münster, Westfalen (B: herb. Nits., sous **V. myriocarpa**, LECTOTYPE); Nitschke, déc. 1865, Schlossgarten, Münster, Westfalen (B: herb. Nits., sous **V. myriocarpa**); Sydow, 24-7-1904, Corylus avellana, Brandenbourg (LAU: sous **E. lata**). **Suède**: Fries (UPS: Scler. Suec. 113, sous **Sphaeria milliaria**, LECTOTYPE). **Suisse**: Acer campestre (198b); Acer sp. (215a); Cornus sp. (9, 14, 24a, 27, 52, 53, 70, 96); Crataegus sp. (3, 23, 93, 139b, 149, 158, 178b, 249, 251, 256c, 257, 289, 304, 340); Cydonia vulgaris (113b, c) Fagus sylvatica (136, 254) Frangula alnus (220a, 258a); Fraxinus excelsior (274, 316); Hedera helix (21, 106, 119); Ligustrum vulgare (145); Lonicera xylosteum (31, 84, 321); Populus italica (29, 32, 33); Prunus armeniaca (72, 73, 76, 80b, 208, 291); P. avium (40a, 40b, 63, 108); P. spinosa (159); Pyrus communis (112b, 182); P. malus (82, 83, 85); Quercus sp. (161, 192, 280); Rhamnus alpina (142,310, 313); R. cathartica (177, 242, 315); R. sp. (339); Ribes rubrum (110); Rosa sp. (141, 143, 241, 278, 281); Salix sp. (10, 122, 206); Sorbus aria (132b, 269); Tilia sp. (107, 137, 166, 190, 234, 267, 305, 306); Viburnum lantana (91, 98, 157, 160, 163, 164, 331); V. opulus (117, 123, 126); Vitis vinifera (187, 194). **Tchécoslovaquie**: Petrak, sept. 1913, Cornus mas, M. Weisskirchen (LAU, ZT: sous **E. lata var. rimulosa**); Petrak, nov. 1913, Tilia sp., M. Weisskirchen (LAU, ZT: sous **E. lata f. Tiliae**); Petrak, avr. 1919, Carpinus betulus, M. Weisskirchen (ZT: sous **E. scabrosa**). **Europe**: Nees, ex herb. Pers. (L: herb. Lugd. Bat. 910267-195, sous **Sphaeria lata**); Persoon (L: herb. Lugd. Bat. 910267-193, sous **S. lata**).

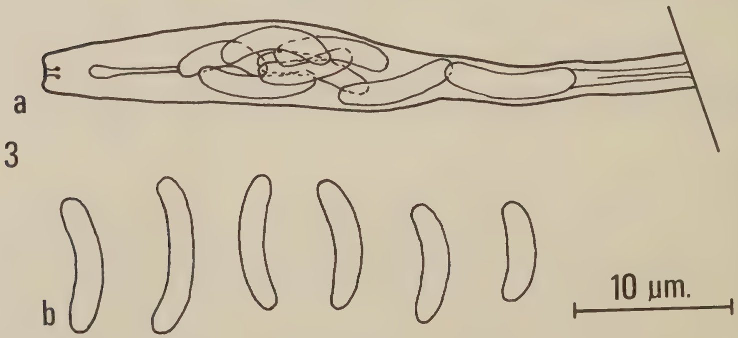

FIG. 3. **Eutypa lata**. a. Asque avec un anneau apical I+. b. Ascospores. a. (Rappaz 267). b. ex herb. Pers. (L: herb. Lugd. Bat. 910267-195, sous S. lata).

Sous **Sphaeria lata**, l'herbier de Persoon comprend 7 exsiccata, dont 6 sont des Eutypa. Parmi ceux-ci, 2 se développent sur Acer et appartiennent à E. lejoplaca, le troisième (sur Prunus spinosa) ne montre ni asques, ni ascospores, le quatrième possède des asques dont l'anneau apical est I- et se développe sur Lonicera. Les deux derniers correspondent à E. lata tel qu'il est délimité dans cet article, l'un se développant sur Crataegus, l'autre, d'après la structure du bois, sur Tilia (Nees, herb. Lugd. Bat. 910267-195). E. lata est considéré par les anciens auteurs comme une espèce ubiquiste. Or, si l'on étudie du matériel vivant isolé de différentes plantes hôtes, on rencontre parfois des souches présentant des variations morphologiques tant sur le téléomorphe qu'en culture, et il est parfois difficile de leur attribuer une position taxonomique précise. Cependant, les cultures isolées de certaines plantes hôtes et notamment de Tilia sont morphologiquement stables et ressemblent à la majorité des isolements effectués à partir d'autres substrats. Malheureusement, le matériel de Persoon sur Tilia possède des périthèces pour la plupart trop vieux; c'est la raison pour laquelle du matériel riche et bien développé, déposé à Leiden, est proposé comme néotype.

Les dessins de Sowerby de S. **fuliginosa** pourraient représenter E. **lata**, cependant, la seule collection authentique de S. **fuliginosa** -Sowerby, Salix sp. Kensington (K: herb. Berk. ex herb. Sow. 2171, sous S. **fuliginosa**)-, ne montre qu'un vieux **Diaporthe**. Fries n'ayant probablement disposé que des dessins de Sowerby pour illuster S. **fuliginosa**, les deux espèces sont maintenues en synonymie.

Les espèces décrites par Nitschke ont été traitées précédemment (Rappaz, 1983).

Le matériel original de C. **crepiniana** est cité sous **Cryptosphaeria minutula** (apparemment non publié) par Gola (1930). La structure du bois ainsi que l'aspect de l'écorce montrent que ce matériel se développe non pas sur Melia azedarach, mais en réalité sur Crataegus sp. D'une façon semblable, la structure du bois du substrat de V. **myriocarpa** (d'après Nitschke: Fagus sylvatica) révèle que cette espèce croît sur un Prunus.

Eutypa lata comprend des souches pathogènes: Barthelet (1938) décrit une variété sur Ribes nigrum, Hansford et Carter une espèce sur l'abricotier (Carter, 1957). Une liste des plantes hôtes ainsi qu'une revue de la littérature phytopathologique est donnée par Carter et coll. (1983).

Comparée à E. **sparsa** et surtout à E. **maura**, E. **lata** est une espèce polymorphe, tant par les variations des longueurs des ascospores que par les longueurs des conidies obtenues en cultures (quand celles-ci sont produites, ce qui n'est pas toujours le cas). J'ai néanmoins cru possible de distinguer E. **lata** d'E. **lejoplaca** principalement grâce à ce dernier caractère, puisque la grande majorité des isolats obtenus à partir d'Acer campestre et pseudoplatanus présentaient des conidies en moyenne inférieures à 25 µm.

4 **Eutypa lejoplaca** (Fr.:Fr.) Cooke, Hand. Br. Fungi (2): 800 (1871)
Sphaeria lejoplaca Fr.:Fr., Syst. mycol. 2:370 (1823) (!!)
Valsa lejoplaca (Fr.:Fr.) Nits., Pyren. germ., p.151 (1867)
Sphaeria prorumpens Wallr. ex Fr.:Fr., Syst. mycol. 2: 357 (1823) (!)
Valsa prorumpens (Wallr. ex Fr.:Fr.) Nits.,
Pyren. germ., p.143 (1867)
Eutypa prorumpens (Wallr. ex Fr.:Fr.) Sacc.,
Syll. Fung. 1: 167 (1882)
Eutypella prorumpens (Wallr. ex Fr.:Fr.) Berl.,
Icon. Fung. 3: 74 (1902)

Stroma: étendu, dans le bois ou dans l'écorce, et dans ce cas le plus souvent recouvert du périderme, soulevant plus ou moins la surface en bosses parfois confluentes ou en plaques plus étendues, la noircissant. Bois ou parenchyme cortical en apparence peu modifié, parfois noirci entre les périthèces. Dans le parenchyme cortical, les limites du stroma sont indiquées par une zone linéaire nécrosée. **Ostioles**: plus ou moins émergents à proéminents, arrondis, globuleux ou coniques, entiers, finement fendus ou sillonnés. **Périthèces**: disposés sur un rang, espacés à rapprochés, parfois en contact ou comprimés les uns contre les autres, sphériques ou ovoïdes, d'un diamètre variant entre 250 - 700 µm. **Asques**: morphologiquement semblables à ceux d'**E. lata** avec un pédicelle de longueur variant entre 75 - 150 µm. Pars spor. mesurant 30 - 60 (70) x 5 - 7 µm. Anneau apical I+ (très rarement I-). **Ascospores**: (fig. 4a) jaune pâle, allantoïdes, mesurant 7 - 12 (13) x 1.8 - 2.2 µm., les moyennes des longueurs du matériel étudié variant entre 8 - 10 µm. **Conidies**: parfois courbées moyennement ou faiblement, mais le plus souvent fortement, mesurant (13) 15 - 28 µm., les moyennes des longueurs du matériel étudié variant entre 20 - 23 (24) µm.

Matrix: sur bois mort d'Acer campestre L., Acer pseudoplatanus L., et probablement, sur d'autres espèces du genre.

Spécimen type: Fries (UPS: Sclerom. Suec. 112b, sous **Sphaeria lejoplaca**, proposé comme LECTOTYPE).

MATERIEL EXAMINE: Autriche: Wallroth, Viburnus opulus, Thüring.(en?) (STR: herb. Wallroth, sous **S. prorumpens**, proposé comme NEOTYPE). **France**: avr. 1982, Acer campestre, Bissy/Uxelles, Saone et Loire (227, 228, 235). **République Démocratique Allemande**: Auerswald, Leipzig (LAU: sous **E. scabrosa**). **Suède**: Fries (UPS: Sclerom. Suec. 112a, sous **S. lata**). **Suisse**: Collecteur inconnu, 22-7-1888, Acer sp., Bischofszell, TG, (ZT: sous **E. scabrosa**); Bolay, 14-5-1974, Acer campestre, Champagne, VD (herb. Sta. fed. Changins, sous **E. armeniacae**); Acer campestre (114, 197, 201, 203, 204, 205a, 205b, 219, 235, 293); Acer opalus (247); Acer pseudoplatanus (5, 13a, 19, 43, 195a, 195b); Acer sp. (237, 250a). **Tchécoslovaquie**: Petrack, mars 1913, Acer sp., M.-Weisskirchen (ZT: sous **E. scabrosa**). **Europe**: Persoon (L: herb. Lugd. Bat. 910267-192, -194 sous **S. lata**).

Sphaeria prorumpens est donné par Wallroth, Fries, et la littérature mycologique en général comme se développant sur Viburnum opulus. L'examen de la structure du bois du matériel de Wallroth montre qu'il s'agit en réalité d'un érable avec **E. lejoplaca**. Une collection de Fries sous **E. prorumpens** s'est révélé être un **E. flavovirens** vétuste et complètement nécrosé. Le matériel de Wallroth est donc proposé comme néotype de **E. prorumpens**. En ce qui concerne la citation des noms d'auteurs, la première publication de ce nom est dans le systema 2, Fries citant Wallroth à la fin de la diagnose (Fl. Crypt. Germ. 2:780, 1833 est l'ouvrage dans lequel Wallroth décrit l'espèce, en citant la référence du Systema). Ainsi, selon l'article 46E, **S. prorumpens** peut être accompagné par "Fr.:Fr." ou "Wallr. ex Fr.:Fr."

5 Eutypa flavovirens (Pers.:Fr.) Tul., Sel. Fung. carp. 2: 57 (1863)
Sphaeria flavovirens Pers.:Fr., Syst. mycol. 2: 357 (1823)
Sphaeria flavo-virens Pers., Syn. meth. fung. p.22 (1801) (!)
Sphaeria flavovirescens Hoffm., Veg. Crypt. 1: 10 (1787)
Sphaeria multiceps Sowerby, Eng. Fung. 3(27): 176 (1803) (!)
Sphaeria viridis Sowerby, Eng. Fung. 3(27): 160 (1803) ?

Stroma: étendu, se développant dans le bois ou dans l'écorce, noircissant et soulevant fortement la surface en bandes ou en plaques étendues, dans l'écorce le plus souvent non recouvert du périderme, parfois pustuleux et diatrypoïde. Entostroma, développé jaune dans la jeunesse, vert-jaune puis vert foncé en vieillissant. **Ostioles:** émergents à proéminents, arrondis-globuleux, coniques ou rectangulaires, finement fendus-sillonnés à profondément fendus parfois presque cruciformes. **Périthèces:** disposés sur un rang, rapprochés ou en contact à comprimés les uns contre les autres, sphériques à ovoïdes, d'un diamètre variant entre 250 - 600 µm. **Asques:** Morphologiquement semblables à ceux d' **E. lata**, avec un pédicelle de longueur variant entre (55) 65 - 100 (120) µm. Pars spor. mesurant 30 - 50 (70) x 5 - 8 µm. Anneau apical I+. **Ascospores:** (fig. 4b) jaune pâle, allantoïdes, mesurant (6) 6.5 - 9.5 (11) x (1.5) 1.8 - 2.2 µm., les moyennes des longueurs du matériel étudié variant entre 7.3 - 8.4 (8.8) µm. **Conidies:** peu à moyennement courbées, mesurant 22 - 35 (40) x 1.2 - 1.5 µm., les moyennes des longueurs du matériel étudié variant entre 24 - 33 µm, mais la plupart des isolements faits sur MA n'ont pas formés de conidies.

Matrix: sur bois mort de feuillus.

Spécimen type: Persoon (L: herb. Lugd. Bat. 910267-560, sous **Sphaeria flavovirens**).

MATERIEL EXAMINE: Angleterre: Sowerby ? (K: ex herb. Berk., 45 sous **S. multiceps Sow.**); Sowerby? (K: ex herb. Berk., sous **S. flavovirens (multiceps)**); Sowerby? (K: ex herb Berk., 222, sous **S. flavovirens Hoffm. a**). **France:** Mougeot, ex herb. Pers. (L: herb. Lugd. Bat. 910267-650, sous **S. flavovirens**); Mougeot & Nestler (UPS: exs. 375, sous **S. flavovirens**). **Maroc:** Pacioni, 29-12-1981, Mamora (K). **République Fédérale Allemande:** Petrak, 2-8-1920, Fagus sylvatica Uetzdorf, Brandenbourg (LAU: sous **E. flavovirescens**). **Suède:** Fries (UPS: Sclerom. Suec. exs. 222, sous **flavovirens Hoffm. a**); Fries (UPS: Sclerom. Suec. exs. 45, sous **S. multiceps Sow.**); Fries (UPS: Sclerom. Suec. exs. 383, Sous **S. prorumpens b**); Fries, Femsjö, Småland (UPS: herb. Fr., sous **S. prorumpens**). **Suisse:** Carpinus betulus (134); Cornus sp. (24b); Corylus avellana (45); Cydonia vulgaris (113a); Fagus sylvatica (1, 28, 35, 37, 38, 44, 62, 87); Fraxinus excelsior (56); Hedera helix (140); Prunus armeniaca (80a, 86a); P. avium (46, 127); P. spinosa (74); Pyrus communis (112a); Quercus sp. (34); Salix sp. (147b); Sambuscus racemosa (154); Tilia sp. (111); Viburnum opulus (124). **Tchécoslovaquie:** Petrak, 29-10-1911, Prunus spinosa, M. Weisskirchen (LAU: sous **E. flavovirescens**). **Europe:** Persoon, Fagus (L: herb. Lugd. Bat. 910267-632, sous **S. flavovirens**).

Les étiquettes de **S. multiceps** dans l'herbier de Berkley à Kew sont identiques à celles des exsiccata 45 et 222 des Scleromiceti Sueciae de Fries. Il est donc probable que les collections de **S. multiceps** ne soient pas authentiques.

La littérature montre souvent une confusion dans l'utilisation des épithètes **flavovirens** dus à Persoon et **flavovirescens** de Hoffmann. Nitschke (1867) d'abord, Saccardo ensuite, ont attribué à tort l'épithète de Persoon à Hoffmann, Saccardo (1882) écrivant par exemple "**E. flavovirens** (Hoffm.) Tul.".

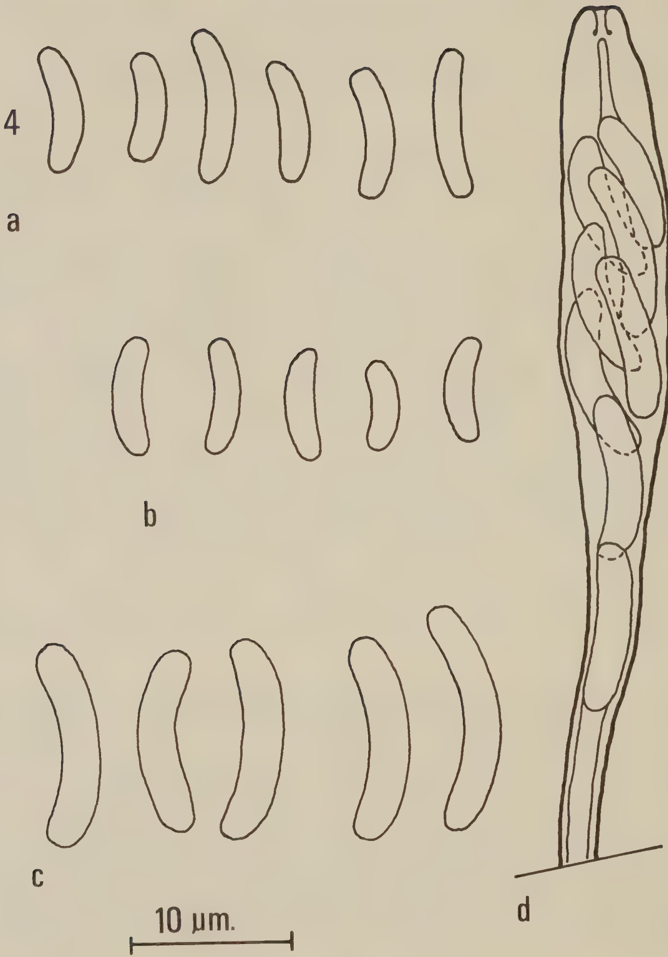

FIG. 4. a. **Eutypa lejoplaca**, Ascospores. b. **Eutypa flavovirens**, Ascospores. c. et d. **Eutypa leprosa**, c. Ascospores. d. Asque avec un anneau apical I+. a. ex herb. Fries (UPS: Sclerom. Suec. 112b, sous **Sphaeria lejoplaca**, LECTOTYPE). b. ex herb. Pers. (L: herb. Lugd. Bat. 910267-560, sous **Sphaeria flavovirens**, NEOTYPE). c. Persoon, **Tilia** sp., (L: herb. Lugd. Bat. 910267-889, sous **S. leprosa**, NEOTYPE). d. (Rappaz 277a).

6 **Eutypa leprosa** (Pers. ex Fr.:Fr.) Sacc., Syll. Fung. 1: 167 (1882)
Sphaeria leprosa Pers. ex Fr.:Fr., Syst. mycol. 2: 377 (1823) (!)
Valsa leprosa (Pers. ex Fr.:Fr.) Nits., Pyren. Germ., p. 136 (1867)
Eutypella leprosa (Pers. ex Fr.:Fr.) Berl., Icon. Fung. 3: 74 (1902)
Eutypa ludibunda (Sacc.) Sacc., Syll. Fung. 1: 167 (1882)
Valsa ludibunda Sacc., Michelia 1: 15 (1877) (!!)

Stroma: étendu, se développant dans le bois ou surtout dans l'écorce, soulevant fortement la surface en pustules ou en bosses parfois confluentes, recouvert du périderme, dans le bois noircissant la surface. Entostroma blanc plus ou moins développé autour des périthèces, les limites du stroma étant indiquées par une zone linéaire nécrosée. **Ostioles**: émergents isolément ou parfois par 2 ou 3, plus ou moins proéminents, parfois mal délimités et arrondis-émoussés, sinon rectangulaires ou coniques, larges et trapus, fendus parfois profondément ou cruciformes. **Périthèces**: sur un ou deux rangs, irrégulièrement disposés, rapprochés ou en contact, parfois comprimés, sphériques, ovoïdes, d'un diamètre variant entre 300 - 800 µm. **Asques**: (fig. 4d) avec un pédicelle de longueur variant entre 70 - 100 (125) µm. Pars spor. mesurant 30 - 70 x 6 - 8 µm. Anneau apical I+. **Ascospores**: (fig. 4c) jaune pâle, allantoïdes, mesurant (9.5) 10 - 14 x (2.2) 2.5 - 3 µm., les moyennes des longueurs du matériel étudié variant entre (11) 11.5 - 12.5 µm. **Conidies**: moyennement à fortement courbées, mesurant 17 - 25 (29) µm., les moyennes des longueurs du matériel étudié variant entre 20 - 23 (25) µm.

Matrix: sur bois mort de feuillus.

Spécimen type: Persoon, Tilia sp. (L: herb. Lugd. Bat. 910267-889, sous **Sphaeria leprosa**, proposé comme NEOTYPE).

MATERIEL EXAMINE: **Italie**: Saccardo, sept. 1876, Robinia pseudoacacia, Selva, Treviso (PAD: Mycoth. Ven. 939, sous **Valsa ludibunda f. Robiniae pseudoacaciae**, proposé comme LECTOTYPE); Saccardo, oct. 1876, Populus nigra, Selva, Treviso (PAD: Mycoth. Ven. 938, sous **V. ludibunda f. Populi nigrae**); Mollez (?), avr. 1891, Morus alba, (localité illisible) (PAD: herb. Sacc., sous **E. ludibunda**); Saccardo, Frangula sp. (PAD: herb. Sacc. sous **E. ludibunda**). **Suisse**: Bolay, 24-10-1975, Vitis vinifera, Tour de la Batiaz, VS (herb. Sta. fed. Changins); Bolay, 4-8-1981, Pyrus communis, Chalais, VS, (183); Bolay, 8-9-1981, Juglands nigra, Gudo, TI (210); Müller, 31-5-1955, Vitis vinifera, Follatères, VS (ZT); Fraxinus excelsior (277a); Prunus armeniaca (218). **Yougoslavie**: Savulescu, 12-3-1938, Acer campestre, Banat (ZT: sous **E. ludibunda**).

Le matériel de Persoon est accompagné d' une note de Petrak mentionnant le fait que cette espèce est différente de **Hercospora tiliae** (Pers.:Fr.) Fr., la confusion ayant parfois persisté.

Le matériel original de **E. ludibunda** est constitué par un mélange d'espèces: certaines collections représentent des espèces du genre **Eutypella** (Nits.) Sacc.: Saccardo, oct. 1873, Morus alba Selva, Treviso, (PAD: Mycoth. Ven. 197, sous **Valsa referciens**); ou contiennent plusieurs espèces: Saccardo, nov. 1873, Robinia pseudoacaccia, Selva, Treviso (PAD: Mycoth. Ven. 196, sous **V. referciens f. robiniae pseudoaccaciae**); enfin certaines collections, bien que possédant un stroma eutypoïde et des ostioles fendus ont des ascospores en moyenne plus courtes (environ 10 µm.): Saccardo, oct. 1876, Populus nigra, Selva (PAD: Mycoth. Ven. 938, sous **Valsa ludibunda f. populi nigrae**); Saccardo, mars 1873, Broussonetia papyrifera, Padova (PAD: Mycoth. Ven. 198, sous **V. referciens**); Saccardo, janv. 1876, Carpinus betulus, Padova (PAD: Mycoth. Ven. 734, sous **V. referciens**), et bien qu'il soit possible que parmi ces dernières, certaines appartiennent à E. **leprosa**, j'ai jugé préférable de ne pas en tenir compte dans la description. La collection originale proposée comme Lectotype possède des ascospores dont les dimensions correspondent à celles de matériel que Saccardo a déterminé ultérieurement comme E. **ludibunda**, ou aux collections que j'ai trouvées dans d'autres herbiers sous ce nom. Typifié de cette façon, E. **ludibunda** est une espèce en tous points semblable à celle de Persoon; Paoletti (1892) incluera d'ailleurs E. **leprosa** dans la synonymie de E. **ludibunda**!, Saccardo lui-même relevant la similitude des deux espèces dans la publication originale de V. **ludibunda**.

7 **Eutypa spinosa** (Pers.:Fr.) Tul., Sel. Fung. carp. 2: 59 (1863)
Sphaeria spinosa Pers.:Fr., Syst. mycol. 2: 368 (1823)
Sphaeria spinosa Pers., Syn. meth. Fung., p. 34 (1801) (!)
Valsa spinosa (Pers.:Fr.) Nits., Pyren. Germ., p. 127 (1867)
Diatrype berengeriana De Not., Sfer. ital. cent. 1, p. 27 (1863) (!)

Stroma: étendu, se développant dans le bois ou dans l'écorce, soulevant fortement la surface en plaques étendues et la noircissant intensément, recouvert fréquemment d'un tomentum brun entre les ostioles. Bois ou parenchyme cortical fortement modifié et intimement mélangé au stroma dont les limites sont indiquées par une zone linéaire nécrosée. **Ostioles**: très fortement émergents, coniques à cylindriques, larges et trapus, profondément fendus à cruciformes, souvent serrés les uns contre les autres. **Périthèces**: disposés sur un rang, en contact ou comprimés, ovoïdes, d'un diamètre variant entre 250 - 450 µm. (largeur) et parfois jusqu'à plus de 1 mm. en hauteur, enfouis dans le bois ou dans l'écorce. **Asques**: (fig. 5a) avec un pédicelle de longueur variant entre 40-80µm. Pars spor. mesurant (20) 25 - 40 x 4 - 6 µm. Anneau apical I+, bien visible. **Ascospores**: (fig. 5b) jaune pâle, allantoïdes, mesurant (5.5) 6 - 8.5 (9) x (1.5) 1.8 - 2.2 µm., les moyennes des longueurs du matériel étudié variant entre (6.5) 7 - 8 µm. N'ayant jamais récolté cette espèce, je ne peux donner aucune indication concernant ses conidies.

Matrix: sur bois mort de feuillus.

Spécimen type: Mougeot & Nestler, Fagus sylvatica (UPS: exs. 376, sous Sphaeria spinosa, proposé comme NEOTYPE);

MATERIEL EXAMINE: **Angleterre**: Grove, 20-10-1883, Edgbaston Park (ex herb. K). **Autriche**: Petrak, oct. 1943, Carpinus betulus, Kernhof, Niederdonau (ZT: sous E. **spinosa**); **France**: Mougeot (L: herb. Lugd. Bat. 910269-769, sous S. **spinosa**); Roumeguère, Fagus sylvatica (G: Roum. Fung. Gall. exs. 891, sous **Diatrype berengeriana**, vieux et détruit). **Italie**: Berenger, août 1846, Leyne (?) (PAD: herb. Sacc. sous **Diatrype berengeriana**, NEOTYPE). **République Fédérale Allemande**: Engel, 2-9-1980, Bramberg bei Ebern, Hassberge, (ex herb. K); Jack, oct. 1863, Fagus sylvatica, Scheuerbuch bei Salem (ZT: Jack, Leiner u. Stizenberger, Kryptogamen badens 831b, 831c, sous E. **spinosa**); Leiner, fev. 1861, Konstanz, (ZT: Jack, Leiner u. Sitzenberger, Kryptogamen Badens 831a, sous E. **spinosa**); Sydow, 6-9-1904, Fagus sylvatica, Hahnenklecklippen bei Braunlage (LAU, ZT: Mycoth. germ. 318, sous E. **spinosa**). **Suède**: Fries (UPS: Sclerom. Suec. exs. 111, sous S. **spinosa** mélangé avec E. **flavovirens**); Fries (UPS: Sclerom. Suec. exs. 111 ex herb. Fr., Sous S. **spinosa**); **Tchécoslovaquie**: Petrak, 18-9-1912, M. Weisskirchen (LAU: sous E. **spinosa**); **Yougoslavie**: von Höhnel, avr. 1901, Fagus sylvatica, Jaize, Bosnie, (ZT: Rehm. ascom. 33, sous E. **spinosa**).

Fries cite plusieurs espèces décrites par Schweinitz dans la synonymie de S. **spinosa**. Les collections de Schweinitz sont constituées de spécimens dont la morphologie du stroma, des ostioles et des asques est très semblable, mais les moyennes des longueurs des ascospores de ces collections sont comprises entre 5.5 et 6.5 (7.0) µm. Une comparaison de souches Européennes et Américaines devrait permettre de mieux délimiter ces espèces. Malheureusement, en Europe en tous cas, E. **spinosa** est une espèce rare et jusqu'ici aucune étude n'a été faite dans ce sens.

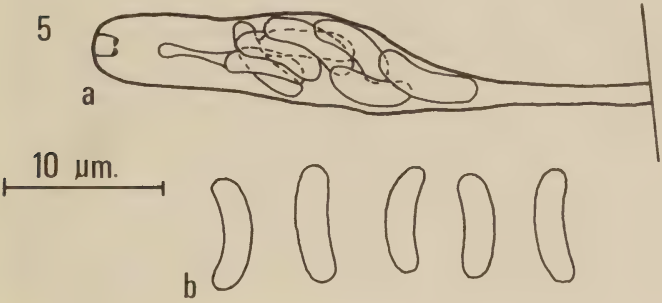

FIG. 5. **Eutypa spinosa**. a. Asque avec un anneau apical I+. b. Ascospores. a. Engel, 2-9-1980, Bramberg bei Ebern, RFA, (ex herb. K). b. Mougeot & Nestler, Fagus sylvatica (UPS: exs. 376, sous **Sphaeria spinosa**, NEOTYPE).

3 TAXA EXCLUS ET SYNONYMES

Dans la synonymie des taxa ci-dessous seuls les noms acceptés sont indiqués en caractères gras.

8 **Cryptosphaeria subcutanea** (Wahl.:Fr.) comb. nov.
  Sphaeria subcutanea Wahl.:Fr., Syst. mycol. 2: 371 (1823)
  Sphaeria subcutanea Wahl., Flor. lap., p. 520 (1812) (!)
  Valsa subcutanea (Wahl.:Fr.) Nits., Pyr. Germ., p. 148 (1867)
  Eutypa subcutanea (Wahl.:Fr.) Sacc., Syll. Fung. 1: 165 (1882)
 Sphaeria vicinula Nyl., Flora 21: 321 (1863) (!!)
  Cryptosphaeria vicinula (Nyl.) Karst., Myc. Fenn. 2: 131 (1873)
  Diatrype vicinula (Nyl.) Berl., Icon. Fung. 3: 98 (1902)
 Anthostoma ontariensis Ell. & Ev., Proc. acad. nat. sci.
  Philadelphia, p. 228 (1890) (!!)
  Eutypa ontariensis (Ell. & Ev.) Tiffanny & Gilman,
  Iowa State J. Sc. 15: 126 (1965)
 Valsa salicicola Allescher, Berichte Bay. Bot. Ges. 1: 199 (1891)
  Eutypa salicicola (Allescher) Sacc., Syll. Fung. 9: 469 (1891)

Espèce apparemment liée au genre Salix. Son stroma corticol dans toutes les collections que j'ai examinées jusqu'ici, les dimensions de ses ascospores -très grandes pour une Diatrypacée- et sa spécificité pour une plante hôte donnée sont autant de caractères plaçant cette espèce dans le genre **Cryptosphaeria** Grev.

Spécimen type: Wahlenberg, 16-8-1802, Salix phylicifolia L., Lapponia kemensis ad Iwalojoensun (UPS: herb. Wahl. sous **S. subcutanea**, proposé comme NEOTYPE).

MATERIEL EXAMINE: Canada: Dearness, Salix, London, Ontario (FH: herb. Ellis sous **Anthostoma ontariensis**); Dearness, 1 Fév. 1890, Salix, London, (NY: 1390, sous **A. ontariensis**, HOLOTYPE); Dearness, Salix sp., London (NY: sous **A. ontariensis**); **URSS:** Fellman, 18-5-1861, Alnus sp., Kola, Lapp. or., (H: sous **S. vicinula**); Karsten, 25-7-1861, Salix sp., Kola, (H: sous **S. vicinula**, proposé comme LECTOTYPE); Karsten, 25-7-1861, Salix sp., Rossia, Lapponia tulomensis, prope Kola versus Tuloma (H: herb. Karsten 2369, Fung. Fenn. exs. 272, sous **Sphaeria vicinula**); Karsten, Salix sp., Mustiala, Tavastia australis (H: herb. Karsten 2371, 2372, 2377, sous **S. vicinula**). **USA:** Shear, avr. 1893, Salix sp., Alcove, N. Y. (NY: New York Fungi 43 et 347 (2 et 3 enveloppes), sous **A. ontariensis**); Peck, mai 1852, Salix discolor, Karner N. Y. (NY: sous **A. ontariensis**).

Le protologue de **A. ontariensis** mentionne des dimensions d'ascospores qui excèdent en moyenne de 5 µm. les dimensions réelles des ascospores trouvées sur le matériel original. Ceci est d'autant plus surprenant que, sur l'enveloppe de l'holotype, sont griffonnées des dimensions qui correspondent beaucoup mieux à la réalité.

Les ascospores mesurées sur le matériel d'URSS sont en moyenne plus petites que celles des autres collections. Cependant, des variations dans les dimensions ont également été constatées dans les collections américaines, certaines de ces dernières montrant des ascospores de taille intermédiaire. Comme tous les autres caractères sont constants d'une collection à l'autre, je préfère les considérer toutes comme représentant une seule et même espèce.

Le matériel de Allescher a été cherché à HBG, B, M, mais aucun de ces musées ne possède de collections de **V. salicicola**.

9 Sphaeria aneirina Somm., Suppl. Flor. Lapp., p. 208 (1826) (!)
Sphaeria aneirina Somm.:Fr., Elench. Fung. 2: 76 (1828)
Diatrype aneirina (Somm.:Fr.) De Not., Sfer. Ital., p. 29 (1863)
Eutypa aneirina (Somm.:Fr.) Sacc., Syll. Fung. 1: 175 (1882)

Synonyme de **Cryptosphaeria populina** (Pers.:Fr.) Sacc., constatation qu'avait déjà faite Berlese (1902).

Spécimen type: Saltadeln (?), in rami Pop. emortui (?) (O: herb. Sommerfeldt, sous **S. aneirina**, proposé comme NEOTYPE).

10 Sphaeria subtecta Fr.:Fr., Syst. mycol. 2: 376 (1823)
Valsa subtecta (Fr.:Fr.) Nits., Pyr. Germ., p. 134 (1867)
Eutypa subtecta (Fr.:Fr.) Fuckel, Symb. Mycol., p. 214 (1870)

Spécimen type: Fries, Lund, Skåne, Suède, (UPS: herb. Fr., sous S. **subtecta**, proposé comme NEOTYPE).

Ainsi que l'avait déjà constaté Romell (1892), le matériel de Fries possède des asques polysporés. Ce caractère conjugué à l'absence d'un stroma développé place l'espèce dans le genre **Cryptovalsa** De Not. Celle-ci est peut-être synonyme de C. **protracta** (Pers:Fr.) Ces. & De Not., raison pour laquelle je ne propose pas le transfert. L'aspect du substrat du matériel ci-dessus est celui d'un érable, ce qui correspond bien aux indications du protologue.

11 Sphaeria systoma Fr.:Fr., Elench. fung. 2: 76 (1828)
Eutypa systoma (Fr.:Fr.) Starb., Bih. Kongl. Svenska Vetensk.- Akad. Handl. Stockholm 19(3): 17 (1899)

Spécimen type: Weinman, Ryssland, Petropolis (UPS: herb. Fr., sous S. **systoma**, HOLOTYPE).

Les ostioles, cylindriques, flexueux, plus ou moins collectivement émergents, souvent très longs, les asques, dont la pars sp. est inférieure à 15 µm. et qui possèdent un anneau apical I+ bien visible, enfin les ascospores très petites (4.8 - 6 x 1.2 - 1.5 µm. sur le matériel original) caractérisent bien cette espèce. Les taxa semblables à celle-ci ont été réunis par Berlese (1902) dans les genres **Peroneutypa** et **Peroneutypella**. Plus tard, von Höhnel (1918) a réuni ces genres avec **Scoptria** Nits. Or, si l'espèce type de ce dernier genre est bien une Diatrypacée, elle possède des ascospores dont les dimensions sont nettement supérieures à celles des espèces rassemblées par Berlese. Ainsi, même si S. **systoma** est bien caractéristique et relativement fréquent, des connaissances supplémentaires sont nécessaires pour lui assigner un genre légitime et taxonomiquement stable. D'après l'aspect du substrat, la plante hôte est Tilia sp.

12 Sphaeria viticola Schweinitz, Syn. Fung. Car., p. 34 (1823)
Sphaeria viticola Schw.:Fr., Syst. mycol. 2: 372 (1823)
Eutypa viticola (Schw.:Fr.) Sacc., Syll. 1: 180 (1882) non Crouan (1867)

Les asques du matériel de Schweinitz: Schweinitz, Salem, (PH: herb. Schw., sous S. **viticola**) sont immatures et sans ascospores différenciées. Ils sont cylindriques et munis d'un anneau apical I+ dont la forme rappelle celui d'une Xylariacée ou d'une Amphisphériacée.

13 Sphaeria crustata Fr.:Fr., Syst. mycol. 2: 376 (1823)
Valsa crustata (Fr.:Fr.) Nits., Pyr. germ., p. 134 (1867)
Eutypa crustata (Fr.:Fr.) Sacc., Atti soc. Ven.-Trent. Sc. Nat. (4):116 (1875)
Valsa cyclospora Nits., Pyr. germ., p. 128 (1867)
Eutypa cyclospora (Nits.) Sacc., Syll. Fung. 1: 164 (1882)

Spécimen type: Fries, Lund, Scania, Suède (UPS: heb. Fr., sous S **crustata** L., proposé comme NEOTYPE).

MATERIEL EXAMINE: France: Vivant, 29-2-1983, Carpinus, environ de Garlin, Basses Pyrénées (ex herb. K). Pologne: Wüstnei, Fagus, Schwerin (B: herb. Nits., sous **V. cyclospora**, LECTOTYPE).

La structure du bois des collections citées ci-dessus ainsi que du néotype de S. **crustata** montre que, dans toutes, la plante hôte est un Ulmus sp. Par la morphologie des asques, par la persistance des paraphyses et la morphologie des ostioles ainsi que par son association apparemment constante avec les Ormes, S. **crustata** se rapproche beaucoup plus de **Eutypella stellulata** (Fr.:Fr.) Sacc. que de n'importe quelle espèce du genre **Eutypa**. De plus, sa grande rareté et l'aspect cyclique des ascospores qui évoque davantage une monstruosité qu'un caractère systématique, rendent difficile l'attribution d'un rang taxonomique précis à ce matériel.

14 Sphaeria dissepta Fr.:Fr., Syst. mycol. 2: 362 (1823)
Quaternaria dissepta (Fr.:Fr.) Tul., Sel. Fung. carp. 2: 107 (1863)
Eutypa dissepta (Fr.:Fr.) Berl., Icon. Fung. 3: 48 (1902)

Spécimen type: Fries (UPS: Scelrom Suec. exs. 224, sous S. **dissepta**).

Le matériel cité par Fries dans le protologue est un coelomycète! Il correspond à la description (celle-ci ne mentionnant aucun caractère microscopique) et constitue le matériel original, interdisant ainsi la désignation d'un néotype correspondant au nom comme il est utilisé actuellement. Il semblerait donc que l'épithète **dissepta** ne soit plus utilisable dans le sens habituel.

4 TAXA MAL CONNUS OU DOUTEUX

15 Sphaeria lata β. (var.) polycocca Fr.:Fr., Syst. mycol. 2: 369 (1823)
Valsa polycocca (Fr.:Fr.) Nits., Pyr. Germ., p. 129 (1867)
Eutypa polycocca (Fr.:Fr.) Karst., Myc. Fenn. 2: 127 (1873)
Sphaeria fragifera Tode, Fung. Meckl., p. 55 (1790) fide Fries
Sphaeria lata Nees non Pers.:Fr., Syst. der Pilze & Schw. p. 296 (1817) fide Fries

MATERIEL EXAMINE: Nitschke, fév. 1865, Prunus spinosa (B: herb. Nits. sous **V. polycocca**)

Au rang spécifique, l'épithète "fragifera" est prioritaire par rapport à "polycocca". Le problème est que Tode n'a pas laissé d'herbier (Hawksworth, 1974), que dans la description de S. **fragifera** il ne cite aucune plante hôte particulière, et qu'en définitive, le seul caractère marquant soit les ostioles profondément fendus. Or, à lui seul, ce caractère est insuffisant pour définir l'espèce, d'autant plus qu' ultérieurement E. **referciens** (Nits.) Sacc. et E. **aspera** (Nits.) Fuck., toutes deux peu fréquentes et mal connues, ont été décrites avec des ostioles fendus. Ainsi, en l'absence de matériel authentique, et même si Rappaz (1983) a proposé le matériel de Nitschke comme néotype bien qu'il eût été peut-être préférable de choisir un élément cité par Fries, des connaissances supplémentaires sont nécessaires avant de proposer un néotype pour S. **fragifera**.

16 Hypoxylon scabrosum Bull., Hist. Champ. Fr., pl. 468, fig.5 (1791)
  Sphaeria scabrosa Bull.:Fr., Syst. mycol. 2: 360 (1823)
  Valsa scabrosa (Bull.:Fr.) Nits., Pyr. Germ., p. 138 (1867)
  Eutypa scabrosa (Bull.:Fr.) Fuck., Symb. mycol. 2: 360 (1870)
 Sphaeria tuberculata Schum., Enum. pl. Saell. 1: 163 (1803)
  fide Fries

Bulliard, comme Tode, est sans herbier (Stafleu, 1967). Or tant sa description originale que ses illustrations montrent que sous H. **scabrosum** se cachent plusieurs taxa: d'une part des espèces du genre **Hypoxylon**, d'autre part des espèces du genre **Eutypa**. L'herbier de Copenhague ne possède pas de collections de Schumacher sous S. **tuberculata** et l'illustration de cette espèce donnée dans le Flora Hafniensis Fungi delineati n'est même pas facilement attribuable à une Diatrypacée. Enfin, les collections examinées sous E. **scabrosa** représentaient en général E. **lejoplaca** ou E. **lata**. Face à cet état de choses, et à moins que du matériel pouvant servir de néotype ne soit trouvé, il vaut mieux ne plus utiliser l'épithète scabrosa dans le genre **Eutypa**.

17 Sphaeria oppansa Fr.:Fr., Syst. mycol. 2: 374 (1823)
  Eutypa oppansa (Fr.:Fr.) Cooke, Grevillea 13: 38 (1884)

Les herbiers de UPS et B ne possèdent pas de matériel authentique sous ce nom et Cooke a transféré l'espèce dans le genre Eutypa d'après du matériel de Schweinitz. D'autre part la description originale en mentionnant "crusta videtur a gelatina formata" ainsi que "perithecia... facile collapsa" ne convient pas particulièrement à une Diatrypacée.

Remerciements: Aux conservateurs des herbiers mycologique de B, FH, G, H, IMI, K, LAU, L, NY, O, PAD, PH, S, STR, UPS, WARI, ZT, pour leurs prêts et leurs efforts dans la recherche de matériel parfois difficile à trouver. Au Dr. B. M. Spooner (K), pour le matériel de Eutypa crustata. Au Dr. H. Knudsen (C) qui m'a spontanément offert une reproduction d'une illustration de Schumacher. Au Dr. A. Bolay pour l'envoi de ses récoltes faites en Australie. A Mademoiselle Anne Jacot pour son aide dans la partie graphique et la forme de cet article. Enfin aux Professeurs E. Müller, H. Clémençon, et au Dr. A. Bolay pour leurs commentaires intéressants concernant ce travail. A tous ici, j'adresse mes plus vifs remerciements.

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Nomenclatural Adjustments in *Stereum* and *Cylindrobasidium* According to the Sydney Code

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According to the changes in the ICBN enacted at Sydney, Australia in 1981, two adjustments are necessary within the genera *Stereum* and *Cylindrobasidium* (Corticiaceae s. lato). These regard the present use of *Stereum ostrea* and *Cylindrobasidium evolvens*.

Jülich (1974) erected the genus *Cylindrobasidium* to accommodate *Thelephora evolvens* Fr. (= *Corticium laeve* Pers.). In the accompanying analysis of the various synonyms, he discussed the problems connected with the typification of these names (pp. 75-77). In any event, both Burt (1926) and Jülich (1974) were convinced that *T. evolvens* and *C. laeve* were synonymous. Burt, however, used the name *C. laeve*.

Both names were sanctioned by Fries, thus the earlier name, *C. laeve*, has priority over *T. evolvens*. It is the author's judgement that *Cylindrobasidium* is a good genus for this species. Therefore, a new combination is proposed:

Cylindrobasidium laeve (Pers.:Fr.) Chamuris, comb. nov.
  ≡ *Corticium laeve* Pers.:Fr., Neues Mag. Bot. 1:110. 1794; Syst. Myc. 1:451. 1821.
= *Thelphora evolvens* Fr.:Fr., Obs. Mycol. 1:154. 1815; Syst. Myc. 1:441. 1821.
  ≡ *Cylindrobasidium evolvens* (Fr.:Fr.) Jülich, Persoonia 8:72. 1974.

For the complete synonymy, see Jülich (1974).

Lentz (1955) agreed with Burt (1920) that Thelephora ostrea Blume and Nees was synonymous with T. fasciata Schw. Both authors treated the species in the genus Stereum; Burt used T. fasciata and Lentz used T. ostrea.

Thelephora fasciata (1822) is earlier than T. ostrea (1826). However T. fasciata was sanctioned at an infraspecific (varietal) rank in the Elenchus. According to Korf's category No. 3 (1982, p.254), sanctioned epithets retain that special status whether an individual chooses to use that name at a specific or infraspecific rank. Fries sanctioned the (infraspecific) epithet fasciata, recognizing the fungus as a distinct entity. Therefore, T. fasciata is both the earlier name, and a sanctioned one. Current generic concepts would prescribe the use of Stereum fasciatum:

Stereum fasciatum (Schw.:Fr.) Fr., Epicr. 546. 1838.
  ≡ Thelephora fasciata Schw., Naturf. Gesell. in Leipzig Schrift. 1:106. 1822. (Incorrectly cited by Burt (1920, p. 155) as 1832.)
  ≡ T. versicolor Swartz:Fr. β T. fasciata (Schw.:Fr.) Fr., Elench. 1:175. 1828.
= Thelephora ostrea Blume and Nees:Fr., Nova Acta Acad. Caes. Leop. Car. 13:13. 1826; Elench. 1:175. 1828.
  ≡ Stereum ostrea (Blume and Nees:Fr.) Fr., Epicr. 547. 1838.

See Lentz (1955) for the complete synonymy.

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NOTES ON HYPHOMYCETES. XLVII.
NEW SPECIES OF *SARCINELLA* AND *SIROSPORIUM*

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ABSTRACT

Sarcinella asiatica Kamal, Rai and Morgan-Jones and *Sirosporium indicum* Kamal, Rai and Morgan-Jones, two new foliicolous species, are described and illustrated from collections made in Uttar Pradesh, India.

INTRODUCTION

Continued study of collections of foliicolous hyphomycetes from the Terai Belt of northeastern Uttar Pradesh has led to the discovery of novel species of *Sarcinella* Saccardo and *Sirosporium* Bubák and Serebrianikow.

TAXONOMIC PART

Sarcinella asiatica sp. nov. (Figure 1)

Maculae amphigenae, fere circulares et parvae sed evadentes magnae et coalescentes aetate progrediente se extendentes per totam folii. Coloniae extense effusae, pulveraceae, nigrae. Mycelium superficiale. Hyphae copiosae, pallide brunneae vel olivaceae, repentes, ramosae et reticulum laxum facientes, septatae, laeves, crassae, 5-7µm latae. Hyphopodia hemisphaerica, interdum subglobosa, pallide brunnea, pleraque unilateralia, 7-14.5µm longa, 7-11µm crassa. Conidiophora micronemata, ex hyphis superficialibus lateraliter oriunda, parva, simplicia, recta, laevia, pallide brunnea, apicem versus pallescentes. Cellae conidiogenae monoblasticae, integratae, terminales, cylindricae, determinatae. Conidia solitaria, sicca, simplicia,

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laevia, subglobosa vel irregulariter sarciniformia, muriformia, septa pleraque decussato modo disposita, atrobrunnea vel atro, valde constricta ad septa, velut, 4-8 lobata, 25-36 X 14.5-29µm.

In foliis vivis hospitis ignoti, Tulsipur, North Gonda Forest Division, Uttar Pradesh, India, November 1979, A.N. Rai, AUA, holotypus.

Infection leaf spots amphigenous, almost circular and small at first, soon becoming large and coalescing with age to cover the whole leaf. Colonies spreading extensively, powdery, black. Mycelium superficial. Hyphae copious, pale brown to olivaceous, repent, branched and forming a loose but well developed network on the leaf surface, septate, smooth, thick-walled, 5-7µm wide. Hyphopodia abundant, hemispherical, sometimes subglobose, pale brown, mostly unilateral, 7-14.5µm long, 7-11µm wide. Conidiophores micronematous, arising laterally from the superficial hyphae, short, simple, straight, smooth, pale brown, paler towards the apex. Conidiogenous cells monoblastic, integrated, terminal, cylindrical, determinate. Conidia solitary, dry, simple, smooth, subglobose to irregularly sarciniform, muriform, septa usually more or less cruciately arranged, dark brown to black, strongly constricted at the septa, thick-walled, appearing 4-8 lobed, 25-36 X 14.5-29µm.

On living leaves; India.

Collection examined: on unidentified leaves, Tulsipur, North Gonda Forest Division, Uttar Pradesh, India, November 1979, A.N. Rai, AUA, IMI 246387, GPU (KR 361), type.

Sarcinella asiatica possesses a broadly similar morphology to *S. glycosmidis* Kamal and Singh but its hyphopodia and conidia are appreciably larger. The hyphopodia of *S. asiatica* are also predominantly unilaterally arranged whereas those of *S. glycosmidis* occur either unilaterally or alternately along the length of its hyphae.

Sirosporium indicum sp. nov. (Figure 2)

Maculae hypogenae, amplitudine variabiles, dispersae, discretae, raro confluentes, persaepe limitatae venis, interdum angulares, usque ad 25mm diam., margine distinctae, brunneae vel atro brunneae. Coloniae semper hypophyllae, pulvinatae, effusae, densae, velutinae, cum massa crassa conidiorum pulveraceorum. Mycelium partim immersum, partim superficiale, ex hyphis pallide brunneis, laevis, ramosis, septatis, repentibus, 2-2.5µm crassis compositum. Conidiophora semimacronemata vel macronemata, mononemata, ex hyphis superficialibus repentibus lateralia oriunda, brevia, erecta, non ramosa, septata, laevia, recta vel leniter flexuosa, sursum leniter geniculata, cylindrica, pallide brunnea, parietibus crassis, 11-55 X 4.5-6µm. Cellae conidiogenae monoblasticae vel polyblasticae, in conidio-

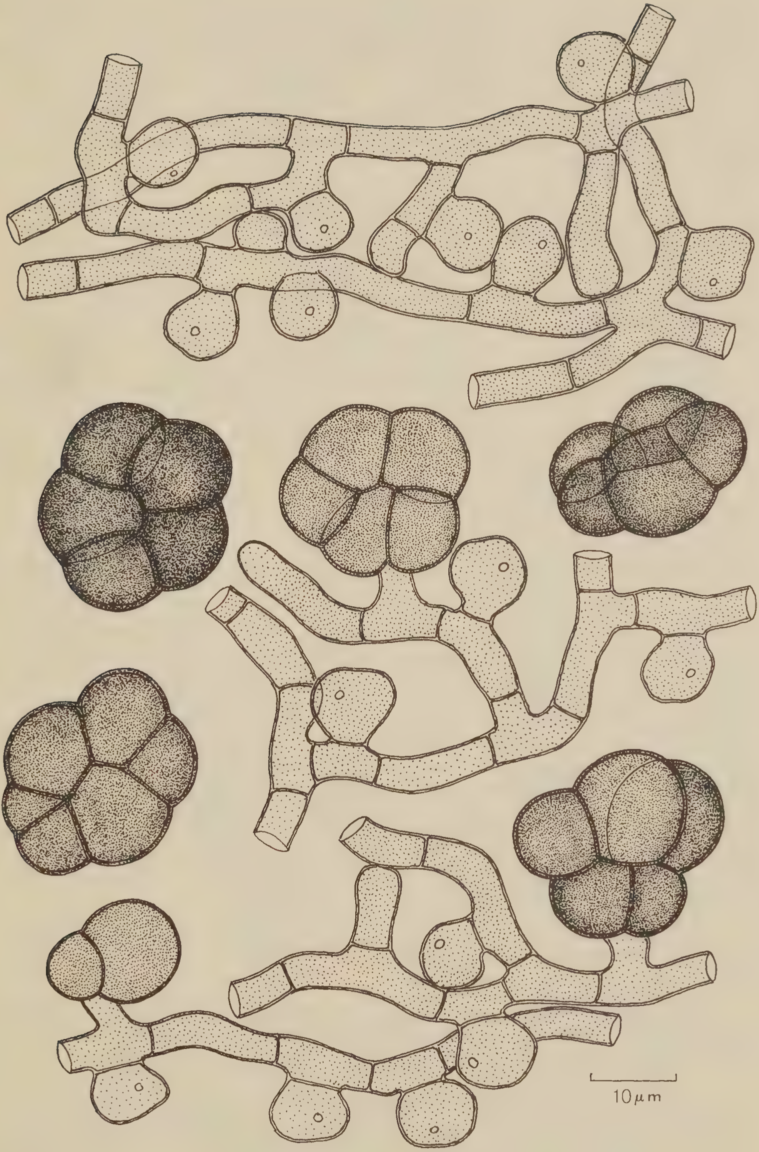

FIGURE 1. *Sarcinella asiatica.*

phoris incorporatae, indeterminatae, terminales, interdum intercalares, sympodiales, cum 1-2 cicatricibus. Cicatrices conidiales circa 1-1.5µm diam., non incrassatae. Conidia solitaria, sicca, acropleurogena, simplicia, laevia, pallide brunnea vel brunnea, recta vel flexuosa, persaepe curvata, cylindrica, saepe fragmentia, apicem versus obtusum decrescentes, ad basem subtruncata, pleraque transverse septatae (1-21) et interdum, etiam cum 1 septo obliquo, 28-92 X 5.5-7µm.

In foliis vivis Grewiae sapidae, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.N. Rai, AUA, holotypus.

Infection leaf spots amphigenous, varying in size, usually isolated, discrete, rarely confluent, very often limited by veins, sometimes angular as a result, up to 28mm in diameter, with a relatively distinct margin, brown to dark brown. Colonies always hypophyllous, somewhat pulvinate, especially towards the center, effuse, dense, velvety, bearing a thick mass of powdery conidia. Mycelium partly immersed, partly superficial, composed of pale brown, smooth, branched, septate, 2-2.5µm wide hyphae; superficial hyphae repent. Conidiophores semimacronematous or macronematous, mononematous, arising laterally from the superficial hyphae, frequently short, erect, unbranched, septate, smooth, straight or slightly flexuous, sometimes somewhat geniculate distally, cylindrical, pale to mid brown, thick-walled, 11-55 X 4.5-6µm. Conidiogenous cells monoblastic or polyblastic, incorporated in the conidiophore, indeterminate, terminal, sometimes becoming intercalary as a result of further growth and septation, sympodial, bearing one or two flat, thin, inconspicuous scars, 1-1.5µm wide. Conidia solitary, dry, acropleurogenous, simple, smooth, pale brown to brown, straight or flexuous, often slightly curved, more or less cylindrical to narrowly obclavate, often fragmenting, tapering to an obtuse apex, subtruncate at the base with no clearly discernible scar, mostly transversely septate (1-21) and sometimes also with one oblique septum, slightly constricted at some septa, these being where schizolytic disarticulation takes place, 28-92 X 5.5-7µm; disarticulated portions 1 to 3-septate, 12-20µm long.

On living leaves of *Grewia sapida* Roxb., [Tiliaceae]; India.

Collection examined: on *G. sapida*, Katarniaghat, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.N. Rai, AUA, IMI 247380, GPU (KR 412), type.

Sirosporium indicum belongs to the non-stromatic group within *Sirosporium*. Its conidiophores resemble those of *S. antenniforme* (Berk. and Curt.) Bubák and Serebrianikow, the type species, *S. celtidis* (Biv.-Bernh) M.B. Ellis and *S. mori* (H. and P. Sydow) M.B. Ellis in basic structure and morphology but are not branched as they occasionally

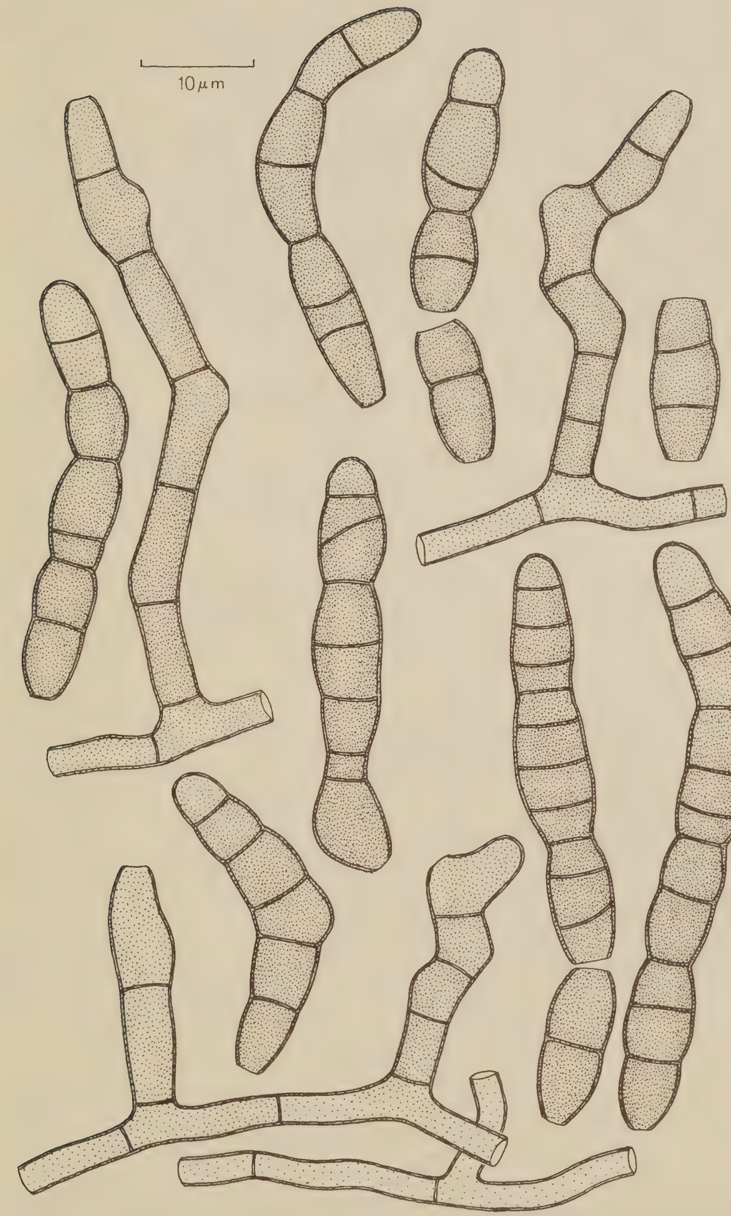

FIGURE 2. *Sirosporium indicum.*

are in those species. It is similar to *S. celtidis* and *S. sesseae* (Pat.) M.B. Ellis in possessing a few, rather wide, thin conidial scars on each conidiophore. It is easily distinguishable from these species by the overall morphology of its conidia, including the absence of longitudinal septae (these are also absent in *S. sesseae*). The easily fragmenting nature of the conidia of *S. indicum* is a particularly distinctive characteristic, being unknown elsewhere in the genus. *Sirosporium indicum* bears some resemblance to species of *Taeniolella* Hughes, especially in conidium morphology. The conidia of the type species of *Taeniolella*, *T. exilis* (Karsten) Hughes tend to schizolytically disarticulate in much the same way as those of *S. indicum* do. *Taeniolella*, however, has micronematous or semimacronematous conidiophores that are monoblastic and non-sympodial.

Sirosporium indicum is the first member of the genus known to occur on a species of the Tiliaceae.

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NOTES ON HYPHOMYCETES. XLVIII.
FULIGOMYCES, A NEW FOLIICOLOUS, ANAMORPHIC SOOTY MOLD GENUS FROM UTTAR PRADESH

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ABSTRACT

Fuligomyces macrosporus Morgan-Jones and Kamal, a new genus and species, is described and illustrated from a collection made on living leaves of *Casearia elliptica* Willd., in Uttar Pradesh, India.

INTRODUCTION

The forests of the Terai belt of northeastern Uttar Pradesh, India, an area with humid, subtropical climatic conditions bordering the foothills of the Himalayas, provide an ideal habitat for numerous foliicolous fungi. In this area a flourishing, but largely undocumented, mycoflora exists. Among the components of this mycoflora, as could be expected given the environmental conditions, are a number of sooty molds. These grow superficially, forming thin hyphal networks on leaf surfaces, deriving nourishment predominantly from leachates. We have encountered in the West Baharaich Forest Division an abundantly occurring anamorphic sooty mold growing on the abaxial surface of *Casearia elliptica* leaves. We believe it to be undescribed and to require a new generic name.

TAXONOMIC PART

Fuligomyces gen. nov.

Deuteromycotina, Hyphomycetes, Dematiaceae.

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[Etym. L *fuligo*, soot, et Gr *myces*, fungus]

Coloniae effusae, densae vel sparsae, atrae. Mycelium superficiale, ex hyphis pallide brunneis, laeves, ramosis, septatis, repentibus compositum. Conidiophora micronemata. Cellae conidiogenae monoblasticae, in hyphis vegetativis incorporatae, intercalares vel terminales, cylindricae. Conidia solitaria, sicca, ex apice lateribusque hypharum oriunda, cylindrica vel obclavata, variabilia, versus apicem irregulariter ramosa, parietibus crassis, brunnea, apicem versus leviter decrescentia et pallide brunnea, laevia vel aspera, muriformia, ad basim truncata.

Species typica: *Fuligomyces macrosporus* Morgan-Jones and Kamal.

Colonies effuse, dense or sparse, black. Mycelium superficial, composed of pale brown, smooth, branched, septate, repent hyphae. Conidiophores micronematous. Conidiogenous cells monoblastic, incorporated in the vegetative hyphae, intercalary or terminal, cylindrical. Conidia solitary, dry, arising terminally and laterally on the hyphae, cylindrical or obclavate, variable, irregularly branched towards the apex, thick-walled, brown, tapering slightly and pale brown apically, smooth or roughened, muriform, truncate at the base.

Fuligomyces macrosporus sp. nov. (Figure 1).

Coloniae semper hypophyllae, extense effusae, discretae vel confluentes, griseae vel atrae. Mycelium superficiale, ex hyphis pallide brunneis, laeves, ramosis, septatis, repentibus, 2-3µm crassis compositum. Conidiophora micronemata. Cellae conidiogenae monoblasticae, in hyphis vegetativis incorporatae, intercalares vel terminales, plerumque intercalares, cylindricae. Conidia solitaria, sicca, ex apice lateribusque hypharum oriunda, cylindrica vel obclavata, variabilia, versus apicem irregulariter ramosa, parietibus crassis, brunnea, apicem versus leviter descrescentia et pallide brunnea, laevia vel aspera, muriformia, ad basim truncata, usque ad 190µm longa, 9-10µm crassa, 4-5µm crassa ad apicem.

In foliis vivis Caseariae ellipticae, Katarniaghat, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.K. Singh, AUA, holotypus.

Colonies always hypophyllous, spreading extensively, particularly proximal to the main leaf veins, discrete or becoming confluent, dark grey to black. Mycelium superficial, composed of pale brown, smooth, branched, septate, repent, 2-3µm wide hyphae. Hyphae forming an abundant, loose network on the leaf surface, sometimes having a scurfy or roughened appearance, usually branching at a wide angle and occasionally anastomosing. Conidiophores micronematous. Conidiogenous cells monoblastic, incorporated in

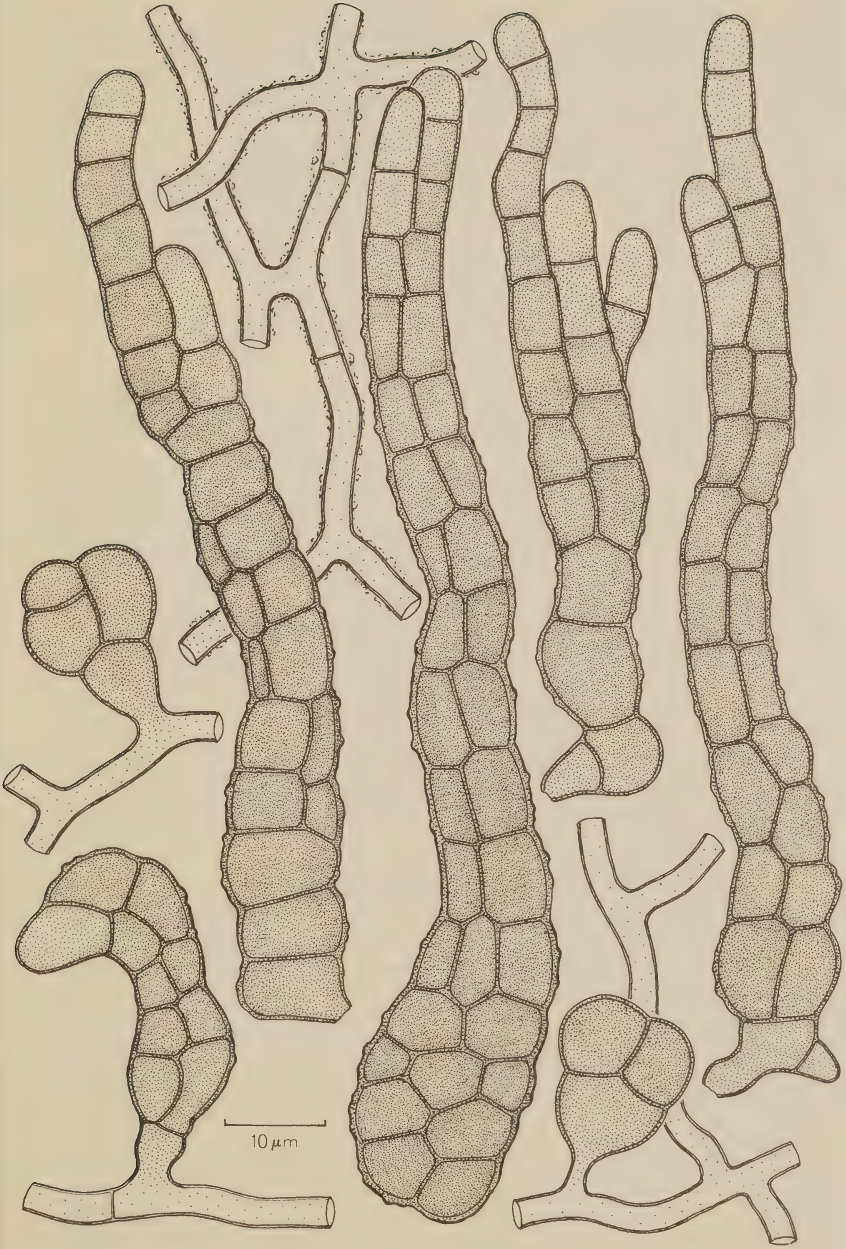

FIGURE 1. *Fuligomyces macrosporus.*

the vegetative hyphae, terminal or, more frequently, intercalary, cylindrical. Conidia solitary, dry, arising terminally, or mostly, laterally from fertile, intercalary, hyphal cells, cylindrical to obclavate, somewhat variable in shape, straight or flexuous, irregularly branched towards the apex, with two or three free finger-like extensions of differing length giving a cheiroid appearance distally, thick-walled, apices tapering gradually and pale brown, smooth or irregularly coarsely roughened, muriform, with two or three vertical columns of cells, frequently inflated in the lower region, base truncate, up to 190µm long, 9-10µm wide, up to 16µm wide where broadest, 4-5µm wide at the apex of each branch.

On living leaves of *Casearia elliptica* Willd., (Samydaceae); India.

Collection examined: on *C. elliptica*, Katarniaghat, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.K. Singh, AUA, IMI 248960, GPU (KA 69), type.

Fuligomyces possesses a unique morphology, unlike that of any other sooty mold genus known to us. It bears some resemblance in morphology and the way its conidia originate to *Capnocheirides* Crane and Hughes. In that genus, however, the initial conidial elements fragment into a number of arthric entities. Among non-sooty mold anamorphs *Ceratosporella stipitata* (Goidànich) Hughes possesses conidia superficially similar in appearance to those of *F. macrosporus* but in that species the closely adpressed conidial branches originate from a single basal cell.

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NOTES ON HYPHOMYCETES. XLIX. *XENOKYLINDRIA OBOVATA*, A NEW SPECIES ISOLATED FROM DISEASED EGGS OF THE NEMATODE *MELOIDOGYNE ARENARIA*, AND *X. PROLIFERA*

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ABSTRACT

Xenokylindria obovata Morgan-Jones, a new species isolated from diseased eggs of the nematode *Meloidogyne arenaria* (Neal) Chitwood from peanut field soil and *X. prolifera* (Matsushima) DiCosmo, Berch and Kendrick, are described and illustrated. They are compared with *Exophiala pisciphila* McGinnis and Ajello.

INTRODUCTION

DiCosmo *et al.* (1983), in their revision of the anamorph genus *Cylindrotrichum* Bonorden, recognized it to contain heterogeneous elements. Its lectotype species, *C. oligospermum* Bonorden, was considered to be sufficiently similar to *Chaetopsis grisea* (Ehrenberg) Saccardo, the type species of *Chaetopsis* Greville, to justify classification of both in one genus. Accordingly, *C. oligospermum* and *Cylindrotrichum hennebertii* Gams and Holubova-Jechova, another species determined to be congeneric with *C. grisea*, were transferred to *Chaetopsis*, that generic name having date priority. Morgan-Jones (1982) drew attention to the similarity between *Chaetopsina romantica* Rambelli and Lunghini and *Chaetopsis*. That species was also placed in *Chaetopsis* by DiCosmo *et al.* (1983). The remaining species previously classified in *Cylindrotrichum* were removed to *Uncigera* Saccardo and Berlese and two newly established genera, namely *Kylindria* DiCosmo, Berch and Kendrick and *Xenokylindria* DiCosmo, Berch and Kendrick. The latter was established to accommodate *Cylindrotrichum proliferum* Matsushima [as *X. prolifera* (Matsushima) DiCosmo, Berch and Kendrick], a species easily distinguishable from others in this complex by its percurrently proliferating phialides.

During the course of our studies of cyst and root-knot nematode pathology we have encountered a fungus parasitiz-

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ing eggs of *Meloidogyne arenaria* in an Alabama peanut field soil with conidiophores resembling those of *X. prolifera* but specifically distinct from it. We believe it to be undescribed but belonging to *Xenokylindria*. An opportunity to examine the type material of *X. prolifera* has enabled us to compare it with our novel taxon.

Some species of *Exophiala* Carmichael produce percurrently proliferating phialides essentially similar to those of *Xenokylindria*. At our laboratory we have isolated *Exophiala pisciphila* McGinnis and Ajello several times from cysts of the nematode *Heterodera glycines* Ichinohe (Morgan-Jones and Rodriguez-Kabana, 1981; Morgan-Jones *et al.*, 1981; Gintis *et al.*, 1982). A comparison is made of the conidiophores of *E. pisciphila* and those of the two *Xenokylindria* species.

TAXONOMIC PART

Xenokylindria obovata Morgan-Jones, sp. nov. (Figure 1)

Coloniae in agaro decocto tuberorum post 10 dies ad 25C, 2.5cm diametro, moderatim vel lente crescentes, coactae, tenues, olivaceo-brunneae; reverso atro. Mycelium superficiale vel immersum, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, laevibus, 1.5-2.5µm crassis compositum. Conidiophora macronemata, mononemata, solitaria, erecta, simplicia vel ramosa, recta vel leniter flexuosa, septata, brunnea vel pallide brunnea, apicem versus pallidiora, laevia, interdum ex basibus bulbosis, usque ad 75µm longa, 2-2.5µm crassa, basi interdum ad 4µm inflata. Cellae conidiogenae phialidicae, percurrenter prolificantes, in conidiophora integratae, terminales vel intercalares, cylindricae. Conidia blasto-phialidica, obovata, laevia, aseptata, hyalina, plerumque guttulata, 3-4 X 1.5-2µm.

Isolatus e ova Meloidogyne arenariae, e terra agresti, Headland, Henry County, Alabama, November 1983, A.K. Culbreath and G. Morgan-Jones, AUA, holotypus.

Colonies on PDA moderate to rather slow growing, reaching a diameter of 2.5cm in 10 days at 25C, felted, thin, with very little aerial mycelium at the margin, olivaceous-brown, often appearing somewhat slimy centrally with conidial production; reverse blackish. Mycelium superficial or immersed, composed of branched, septate, subhyaline to pale brown, smooth, 1.5-2.5µm wide hyphae. Conidiophores macronematous, mononematous, solitary, erect, simple or, more rarely, branched, straight or slightly flexuous, septate, brown to pale brown, paler towards the apex, smooth, with a somewhat thickened wall, occasionally slightly bulbous at the base, up to 75µm long, 2-2.5µm wide, sometimes swollen to 4µm wide at the base. Conidiogenous cells phialidic, proliferating percurrently, integrated, terminal or intercalary, cylindrical; where intercalary, the fertile conidiogenous loci, one to each cell, are located immediately below transverse septa and proliferate less frequently

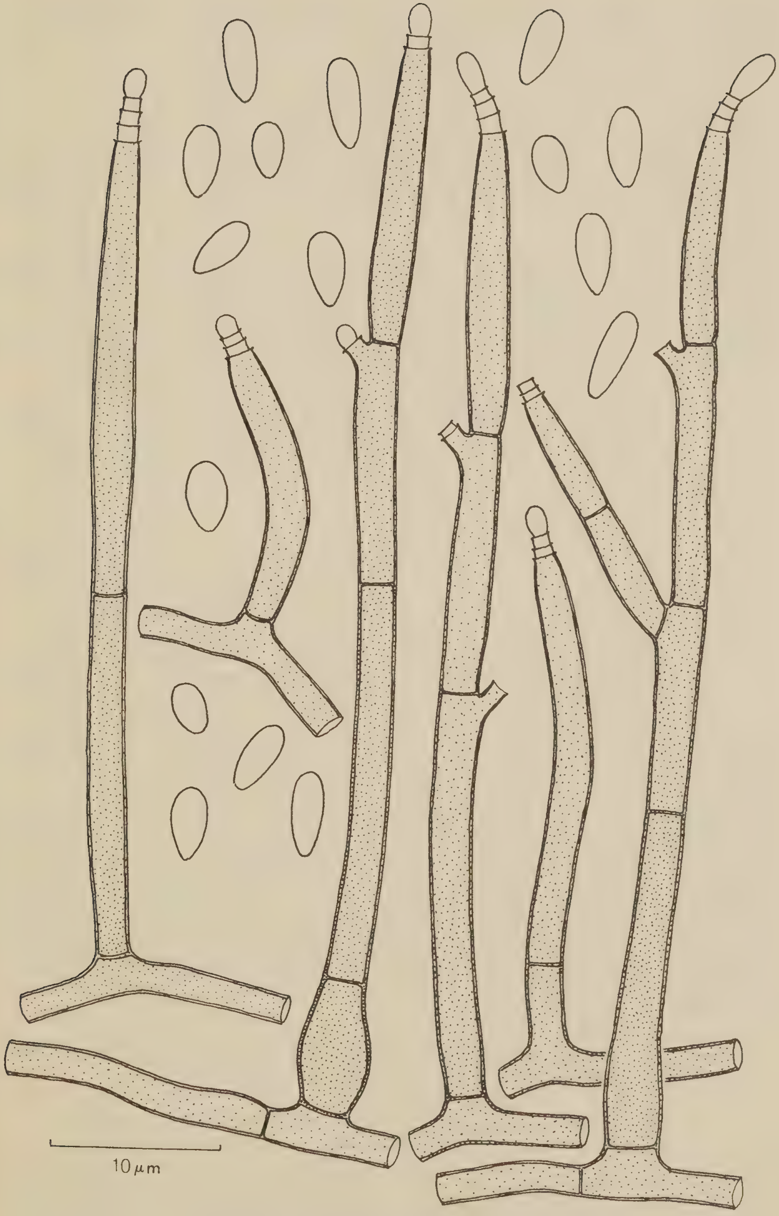

FIGURE 1. *Xenokylindria obovata*.

than when terminal. Conidia blastic-phialidic, obovoid, smooth, aseptate, hyaline, frequently guttulate, 3-4 X 1.5-2µm.

In eggs of *Meloidogyne arenaria*; North America.

Collection examined: isolated from diseased egg of *M. arenaria*, from peanut field soil, Headland, Henry County, Alabama, November 1983, A.K. Culbreath and G. Morgan-Jones, AUA, holotype.

Xenokylindria obovata differs from *X. prolifera* in several respects. Its conidiophores are less robust, paler, somewhat thinner-walled, occasionally branched, and bear a number of conidiogenous loci. In *X. prolifera* the conidiophores are more setiform, unbranched, and have but a single, apical conidiogenous locus. The conidia of *X. obovata* differ from those of *X. prolifera* in being non-septate. Conidial septation is not considered to be of significance at generic level in this instance. It should be noted that in *Exophiala*, with which *Xenokylindria* is compared below, the type species, *E. salmonis* Carmichael, has septate conidia while other species classified in the genus do not.

The conidiophores of *X. obovata* bear some resemblance to those of *Exophiala*. Several species in that genus, including *E. salmonis* and *E. pisciphila* (Figure 2 [isolated from cysts of *Heterodera glycines*, from soybean field soil, Summerdale, Baldwin County, Alabama, September 1980, G. Morgan-Jones, AUA]), have conidiophores with percurrently proliferating conidiogenous cells borne terminally, laterally or intercalarily. Proliferating occurs once or twice in *Exophiala* but up to five times in *X. obovata* and ten times in *X. prolifera*. In *Exophiala* polyphialides, bearing more than one fertile conidiogenous locus, also occasionally occur. The main morphological difference between *Xenokylindria* and *Exophiala* lies in the truly macronematous or differentiated nature of the conidiophores in the former. They are substantially different in appearance from the vegetative hyphae, particularly in *X. prolifera*. In this regard *X. obovata* is somewhat intermediate between the two but its conidiophores are appreciably more differentiated than those characteristic of *Exophiala*. Some conidiogenous cells in *Exophiala* are integrated and intercalary, others are discrete. Where intercalary, the cells differ little from hyphal elements.

Xenokylindria prolifera (Matsushima) DiCosmo, Berch and Kendrick, Mycologia 75: 971, 1983 (Figure 3).

≡ *Cylindrotrichum proliferum* Matsushima, Icones Microfungorum a Matsushima Lectorum 47, 1975.

Colonies effuse to diffuse, gray. Mycelium composed of abundantly branched, septate, subhyaline to pale brown, smooth, 1-2.5µm wide hyphae. Conidiophores macronematous,

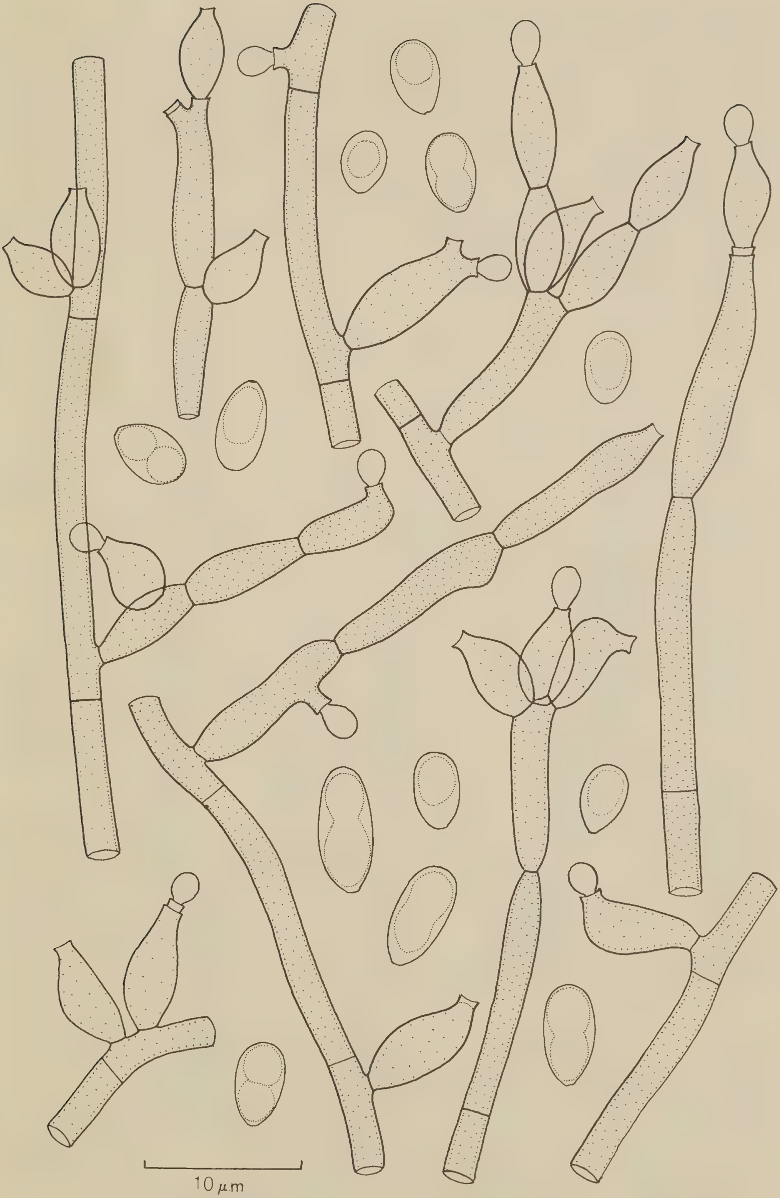

FIGURE 2. *Exophiala pisciphila*.

mononematous, unbranched, erect, straight, form, tapered distally, septate, thick-walled, smooth, brown, paler towards the apex, up to 130µm long, 3-4µm wide, frequently somewhat swollen and up to 7µm wide at the base. conidiogenous cells phialidic, integrated, terminal, cylindical, proliferting percurrently, bearing up to nine, non-flaring collars; proliferated portion subhyaline to hyaline. Conidia blastic-phialidic, ellipsoid to oblong, somewhat variable, one- or, less frequently, two-septate, sometimes slightly constricted at the septa, hyaline, smooth, obtuse at the apex, subtruncate at the base, 6-10 X 2-3µm, aggregated in a mucilaginous mass.

In forest soil; Japan

Collection examined: Kaimon-dake, Kagoshima, Japan, December 1967, T. Matsushima, MFC 2238, type.

DEMATIACEOUS HYPHOMYCETES AND PHYTONEMATODE PATHOLOGY

Several dematiaceous hyphomycetes having slow-growing, dark olivacous colonies, are known to be associated with the pathology of cyst and root-knot nematodes. Korab (1929) isolated what is now thought to have probably been *Phialophora malorum* (Kidd and Beaumont) McColloch from cysts of *Heterodera schachtii* Schmidt in the Ukraine. This was identified by Jaczewski [apud Goffart (1932)] as *Torula heterodera* Jaczewski. What might be the same fungus was encountered by Rozypal (1934) as a principal parasite of *H. schachtii* cysts in Moravia and determined as *Trichosporium populeum* Lambotte and Fautrey. Van der Laan (1956) found *Margarinomyces heteromorpha* (Nannf.) Mangenot in cysts of *Globodera rostochiensis* (Wollenw.) Stone from Perú. Schol-Schwarz (1968) considered *M. heteromorpha* to be a synonym of *Rhinocladiella mansonii* (Castellani) Schol-Schwarz but de Hoog (1977) showed it to be *Exophiala jeanselmei* (Langer) McGinnis and Padhye. *Rhinocladiella mansonii* is now classified in *Exophiala* as *E. mansonii* (Castellani) de Hoog. Goswami and Rumpenhorst (1978) reported a fungus described as being similar to *Phialophora malorum* from cysts of *G. rostochiensis*. Tribe (1979) found *Exophiala pisciphila* and isolates considered to be possibly *E. mansonii* in cysts of *H. schachtii*. As noted earlier we have found *E. pisciphila* with some consistence in cysts of *H. glycines*.

There is reason to believe that these fungi, together with *X. obovata*, are effective invaders of phytonematode cysts and eggs and may play a role in suppressing nematode populations in agricultural soils.

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We thank Dr. Takashi Matsushima, Kobe, Japan, for the loan of type material of *X. prolifera* and Dr. Bryce Kendrick, University of Waterloo, Ontario, Canada, for

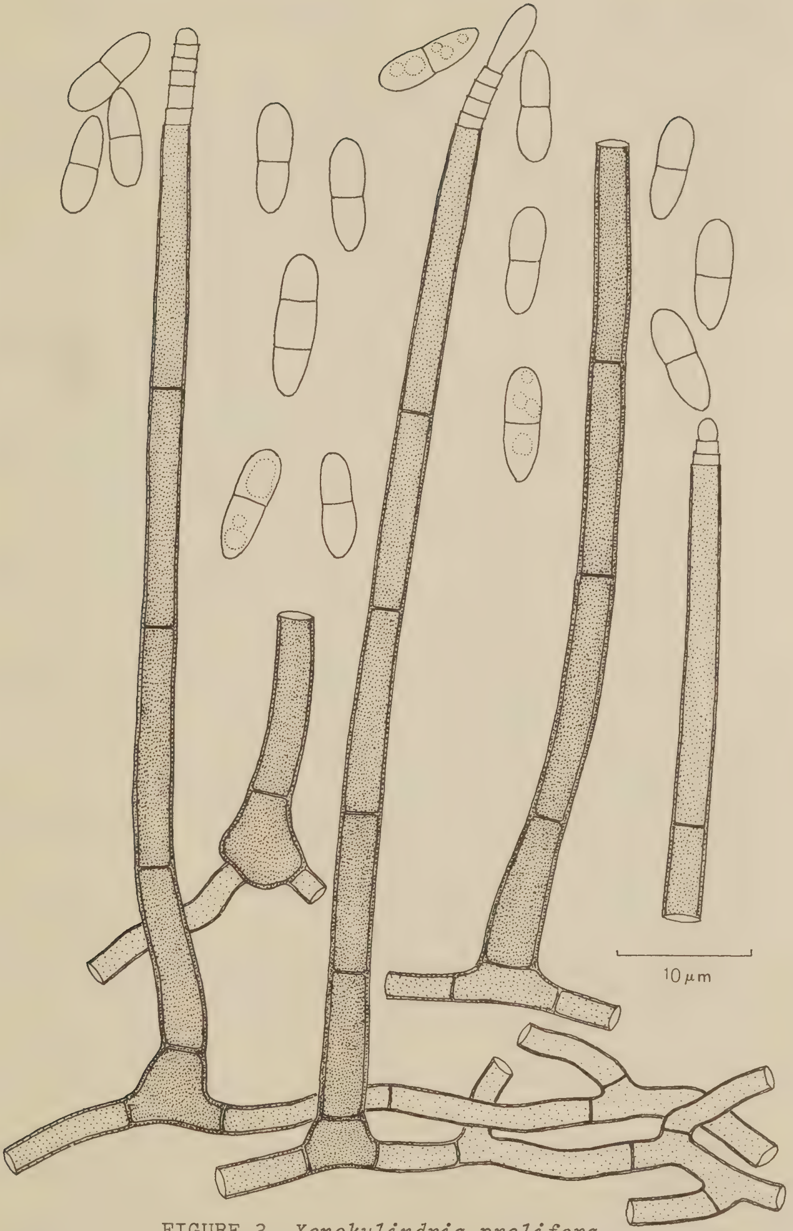

FIGURE 3. *Xenokylindria prolifera.*

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THE ELLIPSOID-SPORED SPECIES OF PULVINULA (PEZIZALES)

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ABSTRACT

The genus **Pulvinula** Boud. consists primarily of spherical-spored species. A single ellipsoid-spored species, **P. ovalispora** Boud., has been described, and previously reported only from the 1912 type collection from Algiers (Boudier, 1917; Pfister, 1976). That type specimen has been reexamined, and is shown to be conspecific with three North American collections, with one from Jamaica, and with one from the Canary Islands, all collected by the senior author. We have made four ellipsoid-spored collections of **Pulvinula** in China, but these differ sufficiently from Boudier's species to require description as **P. ascoboloides** n. sp., with a cyanophilous sheath surrounding the ascospores. Some comments on peculiaritiess of **Pulvinula** are appended.

Spherical ascospores characterize sixteen of the seventeen species of **Pulvinula** Boudier (1885) accepted by Pfister (1976) in his synopsis of the genus, and the five named species and two named varieties (plus the two unnamed "taxonomic species") added since then (Donadini, 1975; Kaushal, 1982; Kaushal et al., 1982; Nemlich and Avizohar-Hershenzon, 1976; Svrcek, 1977; Schumacher, 1982; Waraitch, 1977). The genus is distinct from **Lamprospora**, in which many of the species had been earlier placed, in its gracile, delicate, usually hooked paraphyses [an exception is **P. salmonicolor** (Seav.) Pfister], and in general by possession of tapering ascus bases which, in many species, have a characteristic fork (cfr. Rifai, 1968). The sole ellipsoid-spored species to be referred to **Pulvinula** was **P. ovalispora** Boudier (1917), collected in Algiers in 1912, and apparently never since reported as having been collected again (Pfister, 1976).

The senior author collected an ellipsoid-spored **Pulvinula** in 1948 in Michigan, and submitted the material for determination to Dr Marcelle Le Gal, in Paris. In 1949 she confirmed the collection as **P. ovalispora**, based upon a comparison with the type specimen at PC. Since that time the senior author has collected the species four more times: twice in New York State, once in Jamaica, and once on the island of Tenerife, Canary Islands (close to the type locality, Algiers). In all cases the apothecia had abundant carotenoids, recorded as orange-salmon in fresh condition. One collection is marked "yellow," but whether that refers to fresh or dried material is not recorded. Dried apothecia of all collections are yellow.

In 1981 the senior author had the opportunity to collect discomycetes in Sichuan Province, China, and he obtained two collections of an ellipsoid-spored **Pulvinula** on pebbles, soil, and plant debris that were greenish-yellow. He field-identified both collections as **Ascobolus** sp. The junior author also collected in Sichuan Province, in 1983, and also twice collected the same **Ascobolus**-like species. These four collections, though similar in many respects to **P. ovalispora**, differ markedly not only in apothecial color, but in ascospore size and, above all, in the presence of a well-developed, thickened, loosening, cyanophilic sheath around the ascospores (Fig. 1). This sheath is quite unlike any structure we know in other members of the Pezizales, (with the possible exception of the genus **Jafneadelphus** discussed below). The young ascospores of both ellipsoid-spored species have a thick, gelatinous wall (much as in **Ascobolus** and in **Scutellinia**), and are biguttulate in youth. As spore development proceeds, in both species, an evident cyanophilic spore wall is seen,, which at complete maturity becomes very thin, and is surrounded by another, thin, non-cyanophilic wall layer. The cytoplasm of the fully mature spore becomes refractive, as in the spherical-spored species. One, or sometimes two, at first spherical but eventually irregular, deBary bubbles (gas inclusions) can be seen in many such mature spores in **P. ovalispora** (Fig. o), but such dBbs appear to be rare in the Chinese species.

Through the kindness of Dr. J. Mouchacca (PC), we were able to examine the type specimen of **Pulvinula ovalispora**. It consisted of a single apothecium, glued to a slip of paper, together with a dried-down slide, apparently made by Mme Le Gal at the time she examined Boudier's type. The same specimen had been sent to Dr. Pfister when he was preparing his synopsis, but he apparently avoided making any mounts because of the fragmentary nature of the type specimen (Pfister, 1976). We debated amongst ourselves for some time, after examining Mme Le Gal's slide, whether we should make an additional mount. Her slide revealed ascospores, which we could measure, but few other anatomical features. We finally, reluctantly, soaked up the remaining apothecium (already partially dissected, probably by Mme Le Gal), and proceeded to section a portion of it on a freezing microtome, reglueing the remaining part on the original slip of paper. Our sections proved adequate to study the specimen and to reveal that it has essentially all of the characters displayed by the more recent and better-preserved collections. We have been unable to confirm the branching of the paraphyses illustrated in the sketch accompanying the type packet and also in Boudier's (1917) plate, either in the type material or in the recent collections. Some unmounted sections have been dried down on a slide and placed with the type specimen, and can be easily lifted off for future use by other investigators.

There are rather marked variations in spore and ascus measurements among the six collections of **P. ovalispora** (and even between the mount apparently made by Mme Le Gal and our sections from the same apothecium), but we consider these within the natural variation of the species (Figs. o, p). Professor Pfister (pers. comm.) would weigh ascus length heavily in **Pulvinula**, and if he is correct, assignment of CUP-MM 139 to **P. ovalispora** may be in error. Similar inter-collection differences were noted in the species from China. These data are summarized in Table 1.

TABLE 1. Measurements in micrometers of ellipsoid-spored Pulvinulae.

Spec. #	Hymenium Height	Ascus Width	Spore Measurements Range	Average	Min/Av/Max l/w Ratios
			Pulvinula ovalispora Boud. (spore sheath absent)		
Type (PC) (old slide)	?	?	12.4-16.8x6.5-10.3	13.6x7.2	1.4/1.9/2.1
Type (PC) (section)	140-160	9.0-10.8	11.0-15.4x5.9-8.0	12.6x6.7	1.6/1.9/2.2
RPK 1295	150-160	11.0-13.2	11.0-13.2x6.6-8.0	12.1x7.5	1.4/1.6/1.8
RPK 4065	ca.100	11.0-12.5	9.8-12.4x6.0-7.1	11.1x6.6	1.6/1.7/1.8
CUP 54657	ca.110	11.0-12.0	10.4-13.9x6.6-7.8	11.9x7.1	1.4/1.7/2.0
CUP-MJ 401	120-130	11.0-14.5	11.0-13.2x6.6-7.6	12.3x7.2	1.5/1.7/1.9
CUP-MM 139	250-260	10.2-11.7	13.2-16.1x7.7-11.0	14.3x8.9	1.4/1.6/2.1
			Pulvinula ascoboloides Korf & Zhuang (spore measurements exclude spore sheath)		
CUP-CH 2316	220-225	9.0-11.0	13.2-17.0x6.6-8.2	15.5x7.4	1.8/2.1/2.4
CUP-CH 2392	ca.240	9.5-10.2	14.0-18.0x7.1-8.8	16.1x7.7	1.9/2.1/2.4
HMAS 45054	215-225	10.5-13.0	14.6-17.3x7.3-8.8	15.8x7.8	1.7/2.0/2.3
HMAS 45055	230-260	9.5-12.4	14.0-17.6x7.3-8.1	15.8x7.7	1.8/2.0/2.2

The collection data and the range now known for **Pulvinula ovalispora** is as follows:

ALGERIA: PC-B (holotype). **R. Maire** #483. Koléa. Sur terre. 17.ii.1912.

CANARY ISLANDS (SPAIN): CUP-MM 139. **R. P. Korf, W. C. Denison, L. M. Kohn & M. A. Sherwood.** Just below west entrance to Monte de las Mercedes, Tenerife. On soil. 5.i.1976.

JAMAICA: CUP-MJ 401. **R. P. Korf, J. R. Dixon, K. P. Dumont, R. W. Erb, D. H. Pfister, D. R. Reynolds, A. Y. Rossman & G. L. Samuels.** Along Cane River and slope of Good Hope Mountain, near Kingston, St. Andrew Parish. On cow dung. 12.i.1971.

NEW YORK: R.P.K. 4065. **R. P. Korf.** Stone Quarry Road, Ithaca. On leaf of **Populus** sp. 30.v.1964.

CUP 54657. **R. P. Korf & T. Plowman.** Bergen Swamp, Genesee County. On dead leaves of **Populus**. 1.vii.1964.

MICHIGAN: R.P.K. 1295. **R. P. Korf.** A wooded hollow 1/10 mile S. of Eber White Woods, near Ann Arbor. On leaves. 1.vii.1948.

We present here the diagnosis of the new species:

PULVINULA ASCOBOLOIDES Korf & Zhuang, sp. nov. (Figs. a-n)

A Pulvinula ovalispora Boudier vagina ascosporica cyanophila differt.

Apothecium discoid, sessile, pale yellow, yellow, or greenish-yellow when fresh, 3-5 mm in diam, with a restricted subiculum around the base. **Ectal excipulum** of textura angularis, cells isodiametric, hyaline, 6.5-13.5 µm in diam; **medullary excipulum** of tightly interwoven, hyaline textura intricata, individual hyphae difficult to discern. **Asci** cylindrical, 180-250 x 9.0-13.0 µm, 8-spored, operculate, apex J-, thin-walled in youth and at maturity, but strikingly thick-walled after ascus elongation at about the time of ascospore delimitation, tapering often rather abruptly below to a stalk-like, cylindrical, often coiled or undulate, sometimes branching base. **Ascospores** hyaline, ellipsoid, smooth-walled, 13.2-18.0 x 6.6-8.8 µm, when first formed with a thick, gelatinous non-cyanophilic wall, soon with a strongly cyanophilic, much thinner wall, often biguttulate at that stage, at maturity with the innermost wall layer thin and cyanophilic and with a non-cyanophilic, somewhat thicker outer layer, all surrounded by a much thicker, irregular, loosening cyanophilic sheath that may collapse around all or part of the spore, at full maturity the spore cytoplasm distinctly refractive, guttules absent, deBary bubbles only rarely present. **Paraphyses** filiform, gracile, curved at the apex, septate, containing carotenoid pigments, branched at the base, ca. 1.5 µm wide.

Etymology: from the gross appearance of the apothecia, resembling a soil-inhabiting species of **Ascobolus**.

HOLOTYPE: CUP-CH 2316. **R. P. Korf & R.-y. Zheng.** Woods above Jianfugong, Qingchengshan, Guan Xian, Sichuan, China. On pebbles, soil, and duff. 15.ix.1981. **ISOTYPE:** HMAS 45098.

PARATYPES: CUP-CH 2392. **R. P. Korf & R.-y. Zheng.** Between Wudongtian and Chaoxiting, Qingchengshan, Guan Xian, Sichuan, China. On duff, leaves of various sorts, and **Chamaecyparis** leaves and fruits. 18.ix.1981. (= HMAS 45099)

HMAS 45054. **W.-y. Zhuang.** Emeishan, Sichuan, China. On soil. 25.vi.1983. (= CUP-CH 2480)

HMAS 45055. Same data. On pebbles. 25.vi.1983. (= CUP-CH 2481)

SOME THOUGHTS ON PECULIARITIES OF PULVINULA

The position of **Pulvinula** in the classification of Pezizales has generally been accepted as being close to **Lamprospora, Octospora, Byssonectria** and allied genera of the tribe Aleurieae, assigned to the family Pyronemataceae (Eckblad, **1968**; Korf, **1972**) or Pezizaceae sensu lato (Dennis, **1978**). Certain features of the ellipsoid-spored, as well as the spherical-spored, species we have studied indicate to us that the genus may well deserve a more isolated position than it usually enjoys.

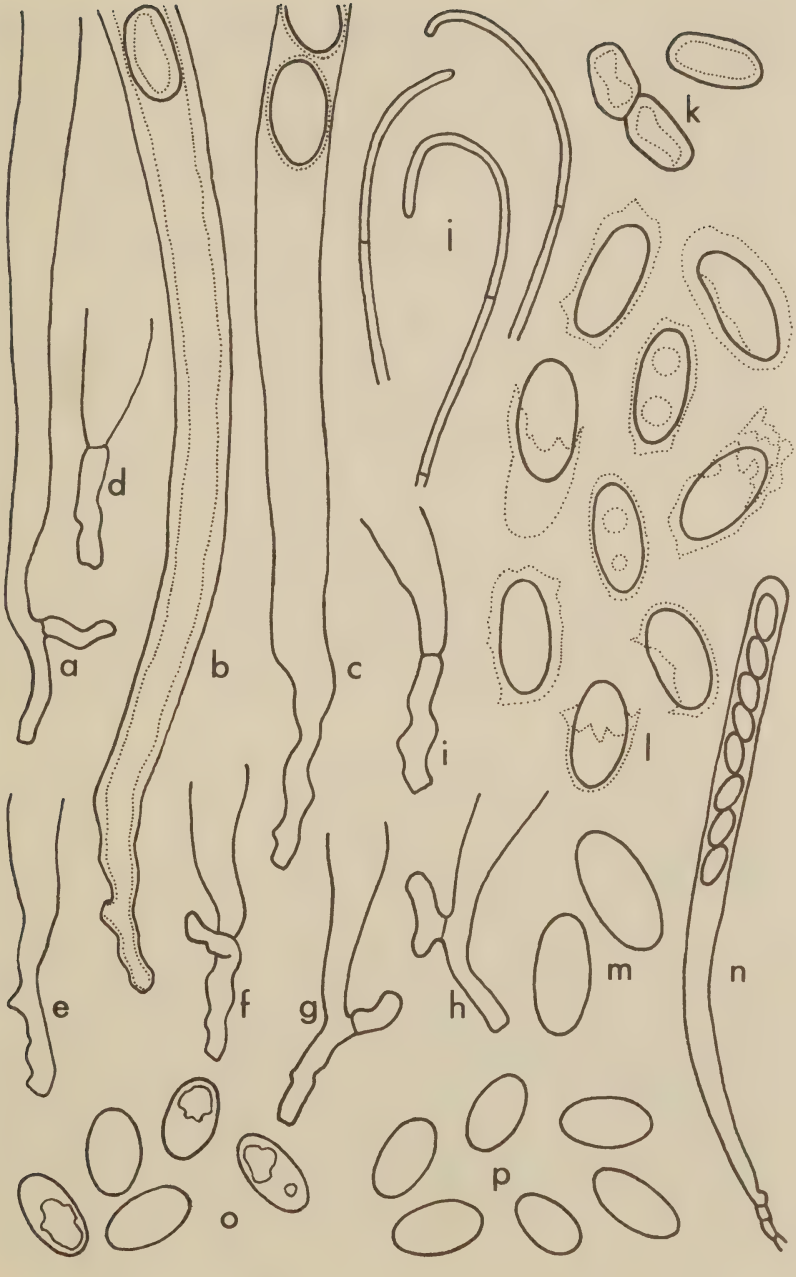
We call attention first to the peculiar ascus base of most species of the genus. The asci are usually borne from croziers that develop on remarkably thin hyphae, and the forked ascus base so evident in many species represents an almost diagnostic feature seldom encountered elsewhere in the Pezizales. Rifai (**1968**: figs. 225-228, 230, 232, 233) illustrates this feature very well. The base of the ascus is often rather abruptly narrowed to form a cylindrical tube that may become coiled or undulate, as in **P. ascoboloides** of this paper (Figs a–h) and in **P. miltina** (Berk.) Rifai as illustrated by Rifai (**1968**: figs. 224, 225). We find the free end of the crozier may even point upwards in our new species (Figs. f–h), not characteristic of the other species we know. The pig-tail like coiling of a cylindrical ascus base is characteristic of certain genera of the Sarcoscyphineae, to which **Pulvinula** shows little other resemblance.

The very thick-walled asci at the time of spore delimitation is another feature we find in the ellipsoid-spored species for which we have no clear counterpart in other members of the Aleurieae. The shift from thin-walled asci at formation (Fig. a), thick-walled (gelatinous walls?) at elongation (Fig. b), and thin-walled again at maturity (Fig. c) mimics the typical bitunicate ascus. If such ascus features are common in other members of this tribe, we have not seen mention of the phenomenon in the literature. Nor have we observed this feature in a brief survey of spherical-spored **Pulvinulae** in our collections at CUP.

The ascospores, too, seem anomalous in this tribe. In both spherical-spored and ellipsoid-spored **Pulvinulae** the ascospore takes on a refractive quality at maturity. Usually it is possible to see a deBary bubble in such ascospores when they are mounted in a medium of high osmotic concentration. The refractive quality resembles that found in the mature spores of **Fimaria** and some other members of the Pseudombrophileae. The ascospore contents must be nearly solid at maturity, since the deBary bubbles that form soon take on an irregular shape (Fig. o), and there may even appear to be more than one in a single ascospore, just as in **Coprobia**, a genus often assigned to the Scutellinieae.

Thick, gelatinous, non-cyanophilous ascospore walls in early youth (Figs. b, k) are characteristic of both the spherical-spored and the two ellipsoid-spored **Pulvinulae**, but can also be found in some species of **Scutellinia**, in **Coprobia**, and in a number of dung-inhabiting species and genera. Notable among these is, of course, **Ascobolus**, placed far distant in the Ascobolaceae. Since the senior author identified both of

Figs. **a–o, Pulvinula** spp. **a–n, P. ascoboloides. a,** base of a young, thin-walled ascus; **b,** base of an elongated, thick-walled ascus with one, young, thick-walled ascospore shown; **c,** base of a mature ascus with two mature ascospores shown; **d–i,** ascus bases; **j,** apices of three paraphyses; **k,** three thick-walled, immature ascospores; **l,** mature ascospores with cyanophilic sheaths; **m,** two mature ascospores, probably slipped out of their sheaths; **n,** mature ascus with 8 ascospores. **o–p,** ascospores of **P. ovalispora**. (All figures x1000 except fig. n, x500. Figs. j and n from CUP-CH 2316; o, from CUP-MJ 401; p, from PC, section of Boudier type; all other figures from CUP-CH 2392.)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his Chinese collections of the new species as **Ascobolus** while in the field, the general resemblance to that genus cannot be ignored.

Yet another **Ascobolus**-like feature of the new Chinese species is that the asci may possibly elongate to exceed the hymenium at the time of spore discharge. The senior author's field notes (hand lens) on one collection (CUP-CH 2316) state "with protruding asci dotting [hymenial] surface." We do not know if other species of **Pulvinula** share this character.

Perhaps the greatest problem we see is in the interpretation of the spore sheath in **P. ascoboloides**. A loosening perispore occurs regularly in **Cheilymenia** and in the closely related genus **Coprobia**, but that is a delicate structure quite unlike the thick, notably irregular, cyanophilic sheath in our fungus (Fig. l). At spore maturity the sheath may loosen, and some smooth, sheathless spores can be seen outside asci (Fig. m), which may be spores which have slipped out of their sheaths. The sheath appears to be formed within the epiplasm, and it is tempting to compare it to the material that is deposited from the epiplasm onto the ascospore surface in **Ascobolus**. There, of course, the material deposited becomes pigmented, at first purple, soon brown (by oxidation?), and is closely appressed to the ascospore surface at maturity.

An entirely different spore sheath is that displayed by **Geneosperma** Rifai [a genus based on **Scutellinia geneospora** (Berk.) Kuntze], where the tapering ends of the sheath suggest that it is a membrane developed across the epiplasmic interfaces of the eight portions of cytoplasm each under ascosporic nuclear control.

Our studies of the members of the genus **Jafneadelphus** (Ascodesmidoideae in Korf's (1972) classification) have shown us a somewhat similar, thick, irregular, cyanophilous spore sheath surrounding the maturing ascospores. As in **Pulvinula ascoboloides**, the young ascospores are very thick-walled, and soon develop a thin cyanophilic wall, but in **Jafneadelphus** the sheath appears to become incorporated in the ascospore markings, the gross warts that are present on ascospores of most species of the genus. It seems that spore marking development in **Jafneadelphus** may more closely approach the situation in **Ascobolus** than hitherto suggested, differing from the typical ornamentation of operculate discomycetes as described by Le Gal (**1947**). The mature ascospore in **P. ascoboloides** remains smooth, and there are no markings with which the sheath may combine. Except for the similar ascospore sheath, there is little to suggest any close relationship of **Pulvinula** with **Jafneadelphus**, however.

Given the unusual features of spherical-spored **Pulvinulae**, and the even more bizarre features of the ellipsoid-spored members, we agree with Pfister (**1976**) and feel that assignment to the Aleurieae is wholly unsatisfactory: "The species of the genus form a discrete unit which only superficially resemble other members of this tribe." We also hesitate, as did he, to erect a new taxon to accommodate the genus. To erect a new monogeneric family would perhaps best reflect merely our present lack of understanding of its closest relatives. A new monogeneric tribe within the Pyronemataceae would merely imply that the genus is isolated, without providing any clue to its real relationships. Further work on the carotenoid pigments may help, for Arpin (**1968**) discovered a unique monocyclic carotenoid in **Pulvinula constellatio** (Berk. & Br.) Boud., as already pointed out by Pfister (**1976**). For the present we will content ourselves with the mental note that **Pulvinula** is, indeed, peculiar.

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TWO NEW RUST FUNGI (UREDINALES)[1]

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ABSTRACT

Cronartium arizonicum sp. nov. on *Castilleja patriotica* is the teliomorph with which *Peridermium filamentosum* Peck *sensu stricto* on *Pinus ponderosa* belongs. The species is heteroecious and occurs in Arizona. *Ravenelia sonorensis* sp. nov. occurs on *Acacia californica* in Sonora, Mexico. It has peridiate aecia *(Aecidium)* and 2-celled central teliospores.

CRONARTIUM ARIZONICUM Cumm. sp. nov.

Status aeciosporiferis *Peridermium filamentosum* Peck in *Pinus ponderosa* Laws. Urediniosporae (20-)22-26(-27) x (13-)14-17(-18) µm, obovoideae vel ellipsoideae, membrana 1-1.5 µm crassa, fere hyalina, echinulata, poris germinationis sparsis, obscuris. Teliae usque ad 1.5 mm longae, brunneae, sporae variabiles, plerumque 45-66 x 9-12 µm, cylindraceae, membrana 0.5-1 µm crassa, flavida vel fere hyalina.

HOLOTYPE: on *Castilleja patriotica* Fern. near turnoff to Barfoot Park, Chiricahua Mts., near Portal, AZ, 10 Sept 1957, Cummins 57-307 (PUR 56446); isotypes issued in Solheim and Cummins Mycofl. Saximont. Exsic. No. 909 as *Cronartium coleosporioides* Arth.

This fungus often has been submerged in *Cronartium coleosporioides* Arth. but has dissimilar aecia and produces a quite different disease of pine. But the teliomorphic state that belongs with *Peridermium filamentosum* has had no name. *Cronartium arizonicum* fills this need.

P. filamentosum is comprised of three races, two of which do not infect *Castilleja* and apparently are autoecious, and the third which is heteroecious and occurs in southern Arizona (Peterson, Phytopathology 58:309-315. 1968.) This is *C. arizonicum*. Southern Arizona (the Santa Rita Mts.) also is the type locality of *P. filamentosum*. The precise distribution of *C. arizonicum* is not known but field observation indicates intimate association of aecial and telial states in areas south of the Grand Canyon.

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[1] University of Arizona Agricultural Experiment Station Journal article No. 3888.

RAVENELIA SONORENSIS Cumm. sp. nov.

Spermogoniis epiphyllis, typus 7. Aeciis *(Aecidium)* hypophyllis in gallae parvus plus minusve 1 mm aggregatis, peridio brevi, aeciosporae (16-)18-24(-25) x (12-)15-17(-19) µm, ellipsoideae, late ellipsoideae vel obovoideae, membrana (1.5-)2 µm crassa, minuteque verruculosa, verrucae interdum plus minusve striatae, pallide brunnea vel fere hyalina, poris germinationis 4-6 plerumque equatorialibus. Urediniis non visis, urediniosporae paucis 23-27 x 15-18 µm, ellipsoideae, membrana 2-3 µm crassa, echinulata, poris 7-9, bizonatis vel in zona equatorialibus sparsis. Teliis subepidermalibus plerumque aeciis consociatis, atro-brunneis, paraphysibus capitatis paucis visis, capitulis teliosporarum (70-)80-110(-115) µm diametro, ex sporis (5)6-8 in omni directione compositis, castaneo-brunneis, levis, sporis centralis plerumque 16-22 µm latis, sporae peripherales unicellularis, interiores bicellulares, cystidiis eodem numero quo cellulis peripherales, capitula adpressis, lateraliter coalitis, pedicelo ex hyphis plures composito, caduco.

HOLOTYPE: on *Acacia californica* Brand., highway 95 k 1997 north of Guaymas, Sonora, Mexico, 17 Jan 1962, Cummins 62-20 (PUR 60086).

The host plant occurs in Baja California but only in the vicinity of Guaymas on the mainland. Both areas are in the Lower Sonoran Zone.

Because of uncertainty concerning the identity of the host this fungus was omitted by Cummins (Mycotaxon 10:1-20. 1979). The status of the uredinia is uncertain but urediniospores and paraphyses were seen in sections. *Ravenelia hieronymii* Speg., also with 2-celled central spores, produces elongate aecial peridia on witches' brooms but lacks uredinia and has pendulous cysts. In *R. spegazziniana* Lindq. all teliospores are 1-celled.

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PROBLEMS INVOLVED IN THE SANCTION OF FUNGAL NAMES

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ABSTRACT

Criteria are suggested for deciding when a fungal name is sanctioned in one of the "basic books". The criteria for sanction are not identical with those previously applied for revalidation. For sanction a more explicit recognition is required than for revalidation.

When several names have been sanctioned for one taxon, priority of the first valid publication decides the accepted name. Sanction should also be retained in cases when Fries changed his mind between publication of the volumes of "Systema mycologicum" and applies to taxa of any rank thus sanctioned. In the case of sanctioned homonymous binomials, both names can be regarded as sanctioned and further decisions are to be taken in accordance with the Code. The necessity of further screening distinguishes sanctioned names from officially conserved names.

The rank of sanctioned names must be clearly established, particularly at infraspecific level, as sanction applies only at the same rank. When the rank is changed subsequently, the notation " : Fr." no longer applies, but the use of " ; Fr." is suggested. The possible cases of citation of sanctioned names are tabulated.

During the compilation of an index to fungal names and epithets sanctioned by Persoon and Fries (Gams, 1984), the senior author encountered numerous problems inherent in the new system of starting point in fungal nomenclature (cf. also Korf, 1982, 1983; Petersen, 1983; and Rauschert, 1983). While some of these problems relate to the sanctioning works of both Persoon and Fries, most of them refer only to Fries's works, as they were published over an interval of eleven years (1821-1832). All examples given below are derived, therefore, from Fries's works ["Systema mycologicum", vols 1-3 (S.M.) and "Elenchus Fungorum", vols 1, 2 (E.F.)].

In this contribution, we will discuss these problems and try to offer solutions. We have had the privilege of helpful comments on our draft from Drs C. Bas, Ellen Farr, D. L. Hawksworth, L. Holm, R. P. Korf, D. H. Nicolson, R. H.

Petersen and J. A. Stalpers. The opinions of our advisors and our own differed in certain points and we thus are unable to offer final solutions for all problems. For the proposals made here we must, however, bear the responsibility ourselves.

Our guiding principles are (a) straightforward adherence to the I.C.B.N. and (b) consideration of the intentions of the sanctioning author as far as they can be understood.

The sanction of a name, in effect, almost equals what is otherwise called conservation (see Art. 14). This means that by the act of sanctioning, names that would otherwise have been illegitimate, are legitimate (but see also 5). This affects both homonymous (illegitimate under Art. 64) and superfluous names (illegitimate under Art. 63). Nevertheless, a sanctioned name is fixed with the date of its original publication. As follows from Art. 14.5, "there is no indication that the date of conservation has any bearing on the correct name when serially conserved names come into competition" (D. H. Nicolson, in litt.).

Examples:

1. *Agaricus candicans* Pers. 1801 is a later homonym of *A. candicans* Schaeff. 1774, and would therefore have been illegitimate. However, the sanction of *A. candicans* Pers. : Fr. (S.M. 1: 91) rendered this name legitimate and *A. candicans* Schaeff. illegitimate.

2. *Agaricus haustellaris* Fr. 1818 would have been a superfluous name for *A. flurstedtensis* Batsch 1786, but is legitimate as it was sanctioned by Fries (S.M. 1: 274).

3. *Alternaria* Nees 1817 was sanctioned in S.M. 1: XLVI (erroneously omitted by Gams, 1984, as were *Monilia* and *Hormiscium*), but reduced to synonymy under *Torula* Pers. 1796 : Fr. in S.M. 3: 500. Not only is *Alternaria* sanctioned, it is also a nomen conservandum, protected against the taxonomic synonym *Macrosporium* Fr. 1821 : Fr. (S.M. 1: XLIV, 3: 373).

1. WHEN IS A NAME SANCTIONED?

Of course not every entry of a name in one of the "basic books" can be considered a sanction. What we now regard as sanction, must have meant acceptance or recognition of a name by Fries. The requirements applied for "revalidation" according to the pre-1981 rules of the Code are therefore conceptually somewhat different from the present requirements for sanction. The mere mention of a name with citation of its protologue was sufficient for "revalidation". A minimum requirement for sanction is thus explicit recognition of the taxon including author's citation of the name. Normally this concerns binomial names printed in full size italics (or trinomial names for infraspecific taxa, see below under 2 and Petersen, 1983). Names that were considered dubious by Fries are not sanctioned. Under this category of unsanctioned names fall the synonyms listed in small print below a recognized taxon, names mentioned incidentally and most (not all!) species listed under headings such as "*species inquirendae*" and expressions like "*huc spectat*", "*X ab Y distinguere nequeo*", etc. With such expressions Fries explicitly indicated that he did not consider an older taxonomic concept sufficiently distinct from the adopted one. Decisions about inclusion in the index of sanctioned names were taken along these lines (Gams, 1984). This is in agreement with Petersen's (1983: 223) statement, that names mentioned in the discussion of another taxon should not be regarded as sanctioned at that place.

Effective sanction is also attributed to the generic names tabulated in the "Introductio" for S.M. 1 (cf. Donk, 1962). The listing of these names within a kind of key is an implicit generic diagnosis (as W.G. remembers Donk's personal communication in this sense).

Names mentioned in footnotes are regarded as sanctioned, provided that no negative remarks on their identity are made; such names were, however, listed by Gams (1984) with a question mark.

The Index after S.M. 3 (which was compiled by Al. Edv. Lindblom) is generally regarded as forming an integral part of the sanctioning work, though it is no longer explicitly cited as such in Art. 13.1d. As explained by Fries on p. 4 of his Index and in a postscriptum, he took the opportunity to revise a few of his previous taxonomic decisions. In this Index, Fries indicated the status of the names by using either Roman or *Italic* print, the latter indicating names that Fries did not accept at that time. In some cases, however, Fries is believed to have erred in the choice of letter type (e.g. *Agaricus occultans* Batsch, S.M. 3, Index: 33, in Roman letters).

The question is whether all names printed in the Index in Roman type are to be regarded as sanctioned or whether the main text should be decisive for the status of a name. On the one hand, it is impossible to recognize exactly those cases where Fries wanted to express a change of mind, and the mere fact that a name was printed in Roman type seems insufficient evidence of sanction. On the other hand, by denying sanctioning effect to Fries's fine indications in the Index, we risk misjudging his intentions.

A few names were quite explicitly sanctioned in this Index in footnotes: e.g. *Achitonium* Kunze (p. 3) and *Crateromyces* Corda (p. 79, both unfortunately omitted by Gams, 1984), *Haplotrichum* Link (p. 93), and *Helotium* Tode (p. 94). In other cases, e.g. *Amphisporium* Link (p. 51), *Byssus* L. (p. 66), *Coccosporium* Corda (p. 77) and *Hyphasma* Reb. (p. 102), Fries's comments were too tentative to make sanction explicit.

Some names included in this Index were not included elsewhere in S.M. Most of these names appeared in Linnaea Vols 3-7, and were published by Fries himself, Junghuhn, Klotzsch, Kunze or Lasch. Gams (1984) did not repeat Fries's Index and, consequently, excluded all these names. Donk (1973) regarded all such names, when printed in Roman letters, as sanctioned, as is evident from his citation of

Polyporus xoilopus Rostk. (Donk, 1973: 381) as a sanctioned name. On the other hand, Petersen (1983) would restrict this recognition and accept sanction only for those names for which an appropriate reference to author and publication, or an explicit circumscription, is given. A practicable criterion seems to be Petersen's, i.e. to consider names lacking explicit citation of bibliographic data as not sanctioned. On the other hand, we have considered the alternative of declaring all names listed with author's name and no bibliographic information as sanctioned (see example 9); considering the citation conventions of Fries's era, Petersen's criterion may be too restrictive. For this reason T.W.K. would follow Donk and regard all names included in Fries's Index in Roman letters as sanctioned, whilst W.G. considers this a very vague basis for sanction and adheres to Petersen's criterion.

Examples:

4. *Acrosporium* Nees : Fr. (S.M. 1: xlv) was not mentioned at any later place in S.M., not even in the Index of vol. 3 (there only as *Acrospermum* Nees in Italics). The name is sanctioned.

5. *Helotium* "Pers." [actually *Helotium* DC. & Lam., see Redhead, 1982] was sanctioned in a footnote in S.M. 1: 500 (cf. Holm, 1983).

6. *Agaricus pachyphyllus* Fr. 1815 was placed under the heading of "Species inquirendae" in S.M. 1: 111. However, this name was printed in Roman letters in S.M. 3, Index: 34, with reference to the page cited. Depending on the decision taken, this fact can either be regarded as sufficient or as not sufficient for sanction.

7. *Agaricus tortilis* Bolt. 1788 was also mentioned under the heading "Species inquirendae" in S.M. 1: 111. In S.M. 3, Index: 45 it was printed in Italics only. This name is not sanctioned.

8. *Agaricus tomentosus* Jungh. was mentioned in S.M. 3, Index: 45 with a clear reference to the description in Linnaea 5: 403. The name is sanctioned.

9. *Agaricus indigo* was mentioned in S.M. 3, Index: 25, as "Schwn. n. sp." but without literature citation. This name (published by Schweinitz (1822: 87), can either be regarded as not sanctioned or, if the reference to Schweinitz is considered an ample literature reference for that era, it can be taken as sanctioned.

2. THE RANK OF SANCTIONED TAXA

In accordance with Art. 60, Korf (1983) formulated his principle 3: "Priority of sanctioned names [and epithets] extends only within the rank assigned by the sanctioning author." But, according to this principle, many present-day genus and species names, formerly sanctioned as infrageneric or infraspecific taxa, are, in fact, not protected in their present rank. This applies to about 10 percent of the names and epithets listed by Gams (1984). It is certainly not justified to cite such taxa with " : Fr.". When a special indication of their sanction (in view of typification problems) is desirable, the use of a different notion, e.g. a semicolon ("; Fr."), seems desirable, as a warning that the taxon is not sanctioned in its present rank (see under 6).

Petersen (1983) provided an instructive review of Fries's varying treatment of infraspecific taxa. In most cases Fries used Roman and Greek letters for his infraspecific ranks, without making clear whether he intended the rank of subspecies, varietas or forma. In only a few cases, did Fries explain his intentions explicitly.

It is clear, however, that infraspecific taxa denoted with Roman letters are subordinate to taxa denoted by Greek letters. According to the taxonomic practices of that time (cf. de Candolle, 1813), the most important infraspecific rank was that of variety, denoted by Greek letters. Consequently, taxa marked with Roman letters should be considered as formae. This seems consistent with the few explicit comments given by Fries himself. In S.M. 1: 229 he listed six taxa, denoted by Roman letters, under *Agaricus cinnamomeus*, and at the end of the same page he referred to them as "seriem formarum constantium".

Fries sometimes inconsistently repeated the initial of a genus after a Greek letter. Apparently he did this when a taxon had been published as an independent species before, and he intended to reduce it to infraspecific rank. That Fries regarded such names as infraspecific, is also evident from the fact that he never replaced any of them when they appeared in homonymous combinations (cf. below). Consequently, such cases should be considered under Art. 24.4, and the status of these infraspecific taxa should be modified to that of variety or forma, depending on the kind of letters used. Such names with repeated genus initials were marked with an asterisk by Gams (1984) without further infraspecific citation.

Examples (mostly adopted from Petersen, 1983):

10. *Agaricus anomalus* Fr. : Fr. (S.M. 1: 220)
    var. *anomalus* Fr. : Fr. (based on α. *proteus*)
    var. *incurvus* (Pers. : Fr.) Fr. (based on *A. incurvus* Pers., cited as "β. *A. incurvus*")
    var. *tabularis* Fr. : Fr. (cited as "γ. *A. tabularis*")
    var. *diabolicus* Fr. : Fr. (cited as "δ. *A. diabolicus*")
    var. *caninus* Fr. : Fr. (cited as "ε. *A. caninus*").

The last three varieties were based on illustrations by Bulliard but the epithets stem from Fries.

11. *Agaricus velutipes* Curt. : Fr. (S.M. 1: 119)
    var. *velutipes* [not mentioned explicitly]
    var. *sphinx* (Batsch : Fr.) Fr. (based on *A. sphinx* Batsch, cited as "β. *Sphinx*")
    var. *atropes* (Schum. : Fr.) Fr. (based on *A. atropes* Schum., cited as "γ. *atropes*")

var. *fuscipes* (Vahl : Fr.) Fr. (based on *A. fuscipes* Vahl, cited as "δ. *fuscipes*")

12. *Agaricus adustus* Pers. : Fr. (S.M. 1: 60)
var. *adustus* [not mentioned explicitly]
unnamed var. [no infraspecific epithet provided under β]
var. *crassus* Alb. & Schw. : Fr. (based on *A. O. adusta* γγ. *crassa* Alb. & Schw., cited as "γ. *crassus*")
var. *elephantinus* (Bolt. : Fr.) Fr. (based on *A. elephantinus* Bolt., cited as "δ. *elephantinus*")

13. *Agaricus gentilis* Fr. : Fr. (S.M. 1: 212)
var. *gentilis* [not mentioned explicitly]
var. *glandicolor* Fr. : Fr. (based on β. *glandicolor*)
var. *punctatus* (Pers. : Fr.) Fr. (based on *A. punctatus* Pers., cited as "γ. *A. punctatus*")
var. *incisus* (Pers. : Fr.) Fr. (based on *A. incisus* Pers., cited as "δ. *A. incisus*")
var. *helvelloides* Fr. : Fr. (based on ε. *helvelloides*)
var. *spurius* (Pers. : Fr.) Fr. (based on *A. spurius* Pers., cited as "ζ. *A. spurius*")

14. *Agaricus murinaceus* (Bull. : Fr.) Fr. (S.M. 1: 116)
forma *murinaceus* [not mentioned explicitly]
forma *aglidius* (Fr. : Fr.) Fr. (based on *A. nitratus* β. *aglidius* Fr., Obs. mycol. 2: 101. 1818)

15. *Agaricus citrinellus* Pers. : Fr. (S.M. 1: 155)
forma *citrinellus* [not mentioned explicitly]
forma *tenellus* (Batsch : Fr.) Fr. (based on *A. tenellus* Batsch, cited as "b. *A. tenellus*")

16. *Agaricus ericetorum* Pers. : Fr. (S.M. 1: 165)
var. *ericetorum* [not mentioned explicitly]
forma *ericetorum* [not mentioned explicitly]
forma *grisellus* Fr. : Fr. (based on *A. O. ericetorum* γγ. *nigro-grisella* Alb. & Schw., cited as "b. *grisellus* A. S.")
unnamed forma [no infraspecific epithet provided]
unnamed var. [no infraspecific epithet provided]
var. *velutinus* Fr. : Fr. (cited as γ. *velutinus*)
var. *myochrous* Fr. : Fr. (cited as δ. *myochrous*)

17. *Agaricus pratensis* Pers. : Fr. (S.M. 1: 99)
var. *pratensis* [not mentioned explicitly]
unnamed formae sub a, b, d, and e (c is lacking)
var. *ericosus* Fr. : Fr. (cited as β. *ericosus*)
unnamed forma
forma *coerulescens* Fr. : Fr. (based on *A. lacmus* Schum., cited as "b. *coerulescens*")
forma *cinereus* Fr. : Fr. (based on *A. meisneriensis* Pers., cited as "c. *cinereus*")
unnamed forma [probably representing forma *ericosus*]

18. 21.a. *Agaricus stipitarius* Fr. : Fr. (S.M. 1: 138), and
21.b. *Agaricus foetidus* (Sow. : Fr.) Fr. (based on *Merulius foetidus* Sow.). Fries apparently considered these two as independent species, although this peculiar notation would at first sight suggest that they were only formae.

19. *Peziza carnea* Fr. : Fr. (S.M. 2: 135) and
Peziza lilacina (Wulf. : Fr.) Fr. β. *P. carnea* (Pers. : Fr.) Fr. (S.M. 2: 140) were not treated as if they were homonyms; *P. carnea* Pers. is sanctioned only at varietal rank.

3. CHOICE AMONG SERIALLY SANCTIONED NAMES

For the sake of corrections (change of mind, cf. under 4) and for other reasons, Fries sometimes "sanctioned" several names for the same taxon (for examples see under 4). The present wording of Art. 13.1d does not indicate explicitly the priority of competing sanctioned names. But it is common sense to admit that the oldest validly published and legitimate sanctioned name has priority (cf. Rauschert, 1983).

Holm (1983) thought that the first sanctioned name should have priority. This reasoning was justified under the pre-1981 rules concerning revalidation, but it is not compatible with the function of sanctioning.

Recently, Nicolson et al. (1984: 315, under *Septoria*) stated a third possibility, viz. that a later sanctioned name should have priority over all older ones. This is based on the philosophy that (later) sanctioned names are treated as if conserved against earlier synonyms and homonyms (whether these are sanctioned or not). Although this philosophy seems plausible, we feel that this possibility was not considered by those who devised the new sanctioning system. It could hardly be reconciled with the proposals made in this paper.

We definitely favour the rule of priority of the first valid publication. If the inversed priority of sanctioned names (postulated by Nicolson et al.) were accepted, it would have cumbersome consequences. These problems could be circumvented either by an explicit statement (comparable to Art. 13.5) that the whole S.M. + E.F. is treated as having been published at one date simultaneously, or by adding a rule that in case of serially sanctioned names, the earliest valid name takes precedence over later ones.

4. FRIES CHANGED HIS MIND

We consider a name, once sanctioned, sanctioned forever, no matter what was its subsequent fate. In the eleven years (1821-1832) which elapsed between Vol. 1 and 3 of the S.M. (in S.M. 3: v, he explained the reasons for the delay), Fries repeatedly changed his mind about status, classification and spelling of certain names. Sometimes he explicitly rejected names that he had previously recognized. Subsequent screening is necessary in many cases amongst the available sanctioned names according to the rules of nomenclature (mainly Art. 64). This is an important difference between sanctioned and officially conserved names. The following possibilities for a change of opinion by Fries may be considered:

a) Fries had accepted a name but later regarded it as a synonym of another older name. The older name was definitely sanctioned by Fries either previously or at the later date. Both synonyms being sanctioned, the older name has priority, if the synonymy is accepted. Moreover, several genera recognized in the "Introductio" were later rejected, but should still be considered as sanctioned.

Examples:

20. *Sporotrichum luteo-album* Link 1809 : Fr. (S.M. 3: 424) and *Botrytis tenera* (Nees 1817 : Fr.) Fr. (S.M. 3: 403) were found to be synonymous. *Luteo-album* is the older epithet and must be accepted. [According to the former rules, *tenera* would have been "revalidated" (by Persoon) before *luteo-album* (by Link)].

21. *Atractium* Link 1809 : Fr. (S.M. 1: xli) was reduced to synonymy with *Volutella* Tode 1790 : Fr. in S.M. 3: 467, but is still sanctioned and should be retained, if the synonymy is not accepted. - See also example 4.

22. *Agaricus ericetorum* Pers. : Fr. (S.M. 1: 165) was later replaced by *A. umbelliferus* L. : Fr. (E.F. 1: 22), because Fries believed that this older Linnean name was synonymous. Both names being sanctioned, the older, *umbelliferus*, has priority (least if this taxon is not treated as a lichen).

23. *Agaricus aquosus* Bull. (1780) was accepted by Fries (S.M. 1: 125), but later (S.M. 3, Index: 7) reduced to synonymy with *A. dryophilus* Bull. (1790) : Fr. *Aquosus*, being the older epithet, is the correct name for this species if the synonymy is accepted.

b) Fries later changed the rank of a taxon according to his taxonomic judgement. Sanction is then operative at both ranks.

Examples:

24. *Agaricus torulosus* Pers. was considered an independent species by Fries in S.M. 1: 181, but regarded as a variety of *A. conchatus* Bull. : Fr. in E.F. 1: 23. Sanction is operative at both ranks.

25. *Helotium* DC. & Lam. was first considered a genus (S.M. 1: 500, footnote) but subsequently reduced to infrageneric status under *Peziza* (S.M. 2: 155). Sanction is again operative at both ranks.

c) Fries sometimes altered the spelling of a sanctioned name.

Examples:

26. *Septaria* Fr. 1819 : Fr. 1821 (S.M. 1: xl) was changed to *Septoria* Fr. 1825 : Fr. (El. 2: 117). To Fries (1825: 119, 195) the reason was to avoid homonymy with a genus of animals. Whether these forms of spelling are to be regarded as orthographic variants, is discussed by Nicolson et al. (1984). Anyhow, *Septoria* Sacc. 1884 is now conserved against the names sanctioned by Fries.

27. The spelling *Hymenella* Fr. 1821 : Fr. (S.M. 2: 233) was later changed to *Hymenula* Fr. 1825 : Fr. (E.F. 2: 37). To Fries (1825: 94; "*Hymenella* S.M. 2: 233 non Sess.") this name change was desirable, as he wished to avoid confusion with *Hymenella* Sess. [actually *Hymenella* Mocino & Sessé ex DC. 1824], although this did not predate *Hymenella* Fr. 1821. In 1828 (E.F. 2: 37) he referred to an erroneous citation of *Hymenella* by Sprengel under *Thelephora odorata*, which in his view might have given additional weight to the name change.

According to priority of first valid publication, *Hymenella* Fr. : Fr. overrides *Hymenula* Fr. : Fr., which is then a superfluous name. The later spelling, at present dominant, becomes a candidate for conservation. But according to Nicolson et al. (1984), *Hymenula* Fr. : Fr. would take priority over *Hymenella* Fr. : Fr.

5. HOMONYMS

Because of the very wide generic concepts which Fries adopted, it was inevitable that he repeatedly sanctioned homonymous binomials (although usually in different infrageneric taxa). From Fries's indices to the volumes of S.M. it is evident that he was aware of the impropriety of this situation and he usually tried to "correct" such cases. Cross references to these corrections have generally been given in the index by Gams (1984). Only a few cases were encountered where a homonymy was not corrected by Fries. Obviously both homonyms are sanctioned, although one of them is inevitably illegitimate (Art. 64). The replacing name obviously is sanctioned too. Again the oldest validly published name should have priority, irrespective of the exact date of sanction. Unless the effect of sanction can be construed to admit the legitimate coexistence of homonymous binomials, the later epithet must be dropped or at least its date adjusted to that of the first legitimate combination (Art. 72, Note 1). Parenthetically, Fries often replaced both names, although he should have retained the oldest.

Examples:

28. *Agaricus fragilis* Pers. 1801 : Fr. (S.M. 1: 57) is a homonym of *A. fragilis* Batsch 1789 : Fr. (S.M. 1: 269). Fries (E.F. 1: 36) later held the opinion that the name *A. fragilis* Batsch [: Fr.] referred to old specimens of *A. furfuraceus* Bull. [: Fr.], and he rejected Batsch's name accordingly. However, this taxonomic decision does not invalidate the sanction of *A. fragilis* Batsch. Fries (S.M. 3, Index: 21) also reduced *A. fragilis* Pers. to varietal status under *A. emeticus* Schaeff. : Fr. Although *A. fragilis* Pers. is a homonym, it is sanctioned at both speci-

fic and varietal ranks.

29. *Agaricus nitens* Vahl 1792 : Fr. (S.M. 1: 284) is a homonym of *A. nitens* Batsch 1789 : Fr. (S.M. 1: 116). When Fries realized that he had used the epithet *nitens* twice, he changed both names (S.M. 1: 511). The name change *A. glauconitens* Fr. [: Fr.] for *A. nitens* Batsch was superfluous, whereas the change *A. luteonitens* Fr. [: Fr.] for *A. nitens* Vahl was correct. As both *A. nitens* Batsch and *A. glauconitens* Fr. are sanctioned, the former, older name should be retained.

30. The generic name *Helotium* was sanctioned twice by Fries, viz. *Helotium* DC. & Lam. 1805 : Fr. (S.M. 1: 500 foot-note) and *Helotium* Tode 1790 : Fr. (S.M. 3, Index: 94). The latter name has date priority over the homonymous *Helotium* DC. & Lam., although this name was sanctioned eleven years earlier, since the date of sanctioning is irrelevant. According to Nicolson et al. (see above), *Helotium* Tode would have to be retained.

31. The homonymy of *Agaricus pusillus* Fr. : Fr. (tribus *Naucoria*) (S.M. 1: 264) and *A. pusillus* (Pers. : Fr.) Fr. (tribus *Volvaria*) (S.M. 1: 279) was apparently not corrected. But *A. pusillus* Fr. : Fr. was changed without explicit statement to *A. pusiolus* Fr. : Fr. in E.F. 1: 36 and also recognized in S.M. 3, Index 38.

32. The homonymy of *Sphaeria conferta* Fr. (1823): Fr. (tribus *Confertae*) (S.M. 2: 435) and *S. conferta* Schw. (1822): Fr. (tribus *Byssisedae*) (S.M. 2: 444) was not corrected by Fries. Both names are sanctioned. Since *S. conferta* Fr. : Fr. is a later homonym of *S. conferta* Schw. : Fr., it cannot be "transferred" to another genus without taking on new authorship and a new date under the provisions of Art. 72 Note 1. When Fries "transferred" the species to *Stigmatea* in 1849, a new name was created: *Stigmatea conferta* Fr. (not "(Fr. : Fr.) Fr." as one might expect).

6. GRAMMAR OF CITATION OF SANCTIONED NAMES

Sanction (a) implies protection against competing synonyms and homonyms, (b) serves to indicate possible typification. According to recommendation 50.E2, a sanction of a name should, if desirable, be indicated with a colon (:). The idea of this notation stems from Donk (1961). However, ambiguities still exist in the ways ": Fr." is applied (cf. Korf, 1983; Petersen, 1983; Rauschert, 1983). With one possible modification (see below) our suggestions for citation are consistent with Korf's. His main principle is not to convey more information with the ": Fr." notation than the statement of sanction. As sanction is firmly tied to the epithet, a double citation of Fries is required when both sanction and change of classification occurred at the same time. No differentiation can be made in citation ("Fr. : Fr.") between names coined by Fries before S.M. and those first described in S.M.

When the rank of a taxon has been altered since its sanction (see under 2b and because of any taxonomic redisposition), according to the Sydney Code recommendation 50.E2, the colon citation might still be used. Neither in that recommendation, nor in Korf (1983) was a warning given that in such cases the symbol ": Fr." must not be used, because the name or epithet is not protected in its present rank. Only Nicolson et al. (1984) deliberately omitted the ": Fr." notation in *Collybia*, which was sanctioned as "tribus" in S.M. 1: 9 and 129, as being (according to Art. 33.5) a "taxon without rank".

When it is judged desirable to indicate sanction of names with altered rank (for the sake of function (b) above), we find it advisable to adopt a different notation, e.g. a semicolon (; Fr.), as a warning that a name (or epithet) is no longer protected. A semicolon was already suggested by Donk (1961) in a different sense. The lack of a defined rank in sanctioned infrageneric names (Nicolson et al., 1984) provides an additional argument for the desirability of a differentiated notation.

Possible situations and notations of specific and infraspecific sanction (with increasing complexity) are summarized in the following table, in which capital letters are used to indicate genera, lower-case letters originally specific, and Greek letters originally varietal epithets.

CONCLUSION

We hope that our views will encourage discussion on the problems inherent with sanctioned names. We trust the committee established to deal with these problems will be able to make unambiguous decisions and guide mycologists through the perils of sanctioning.

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TABLE

pre-Fries (author P.)	Fries (sanction)	present name (new author N.)
1. Post-Friesian name		
blank	blank	*A a* N.
2. Name first described in basic book		
blank	*A a* Fr. : Fr.	*A a* Fr. : Fr. *B a* (Fr. : Fr.) N.
3. Non-sanctioned pre-Friesian name		
A a P.	blank	*A a* P. *B a* (P.) N.
4. Sanctioned name without change of rank		
A a P.	*A a* P. : Fr.	*A a* P. : Fr. *B a* (P. : Fr.) N.
4a. P. = Fr.		
A a Fr.	*A a* Fr. : Fr.	*A a* Fr. : Fr. *B a* (Fr. : Fr.) N.
5. Name with changed generic classification		
A a P.	*B a* (P. : Fr.) Fr.	*A a* P. : Fr. *B a* (P. : Fr.) Fr. *C a* (P. : Fr.) N.
6. Rank changed by Fries to variety		
A b P.	*A a* var. *β* (P. : Fr.) Fr.	*A a* var. *β* (P. : Fr.) Fr. *A β* P. ; Fr. *B a* var. *β* (P. : Fr.) N. *B β* (P. ; Fr.) N.
7. Varietal rank used by pre-Friesian author and Fries		
A a var. *β* P.	*A a* var. *β* P. : Fr.	*A a* var. *β* P. : Fr. *A β* (P. ; Fr.) N. *B β* (P. ; Fr.) N. *A b* var. *β* (P. : Fr.) N.
8. Rank raised by Fries from variety to species		
A a var. *β* P.	*A β* (P. : Fr.) Fr.	*A β* (P. : Fr.) Fr. *A a* var. *β* P. ; Fr. *A b* var. *β* (P. ; Fr.) N.
9. Change from species to variety occurred after Fries		
A a P.	*A a* P. : Fr.	*A b* var. *α* (P. ; Fr.) N.

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OBSERVATIONS ON SOME EASTERN HIMALAYAN HELOTIALES

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SUMMARY

This is the description of seven new species and one new genus of the Helotiales of the Eastern Himalayas. Four of the species belong to the Hyaloscyphaceae, namely Calycellina thindii, Calycellina montana, Mollisina uncinata and Parachnopeziza bambusae and three to the Leotiaceae, Encoelia himalayensis, Encoelia montana and Mollisinopsis filicis. Encoelia heteromera (Mont.) Nannf. and the genus Encoelia are recorded for the first time from the Indian subcontinent. Furthermore there are descriptions of three specimens which may be identical or very near to Lambertella aurantiaca Tewari & Pant, Mollisia melaleuca (Fr.) Sacc. and Ciboria peckiana (Cooke) Korf f. gigaspora (Korf) Korf. Another specimen named Lambertella taxonomic sp. I is described and figured. There are provided keys to the Indian species of Calycellina and Encoelia. Mollisina indica Arendholz & R. Sharma is transfered to the new genus Mollisinopsis.

ZUSAMMENFASSUNG

Sieben neue Arten und eine neue Gattung der Helotiales aus dem östlichen Himalaya-Gebiet werden beschrieben. Vier der neuen Arten gehören zu den Hyaloscyphaceae, nämlich Calycellina thindii, Calycellina montana, Mollisina uncinata und Parachnopeziza bambusae und drei zu den Leotiaceae: Encoelia himalayensis, Encoelia montana und Mollisinopsis filicis. Encoelia heteromera (Mont.) Nannf. und die Gattung Encoelia werden zum ersten Mal für den indischen Subkontinent nachgewiesen. Weiterhin werden drei Arten beschrieben, die möglicherweise identisch oder sehr nahe verwandt sind mit Lambertella aurantiaca Tewari & Pant, Mollisia melaleuca (Fr.) Sacc. und Ciboria peckiana (Cooke) Korf f. gigaspora (Korf) Korf. Eine weitere Lambertella-Art (Lambertella taxonomic sp. I) wird beschrieben und abgebildet. Zur Bestimmung der indischen Calycellina- und Encoelia-Arten werden Schlüssel gegeben. Mollisina indica Arendholz & R. Sharma wird zu der neuen Gattung Mollisinopsis gestellt.

RESUME

Voici la description de sept nouvelles espèces et d'un nouveau genre trouvés dans le Himalaya oriental. Quatre des espèces nouvelles font partie des Hyaloscyphaceae, c'est-à-dire Calycellina thindii, Calycellina montana, Mollisina uncinata et Parachnopeziza bambusae, trois des Leotiaceae: Encoelia himalayensis, Encoelia montana et Mollisinopsis filicis. C'est la première fois que Encoelia heteromera (Mont.) Nannf. et le genre Encoelia sont documentés dans le sous-continent indien. En voilà de plus la description de trois espèces peut-être identiques à Lambertella aurantiaca Tewari & Pant, Mollisia melaleuca (Fr.) Sacc. et Ciboria peckiana (Cooke) Korf f. gigaspora (Korf) Korf ou très proches parents d'eux et celle d'une autre espèce de Lambertella taxonomic sp. I accompagnée d'une illustration. On présente des clefs de détermination pour les espèces indiennes de Calycellina et Encoelia. Mollisina indica est rangée au genre nouveau Mollisinopsis.

In a previous paper ARENDHOLZ & R. SHARMA (1983) reported about 12 species collected by the junior author from the Eastern Himalayas. This is a continuation of the above mentioned contribution. The methods are the same as described there. It may be mentioned here that the negatives of the plates are taken by the senior author on Ilford Pan F (SEM and macroscopic photographs) and Agfa ortho 25 (light microscope). The films were developed in Agfa Rodinal 1 + 25 (Ilford Pan F, 5 min.), 1 + 20 (Agfa ortho, 4 min.) respectively. The prints were made on Agfa Brovira speed paper.

All collections cited have been deposited in PAN (Panjab University, Botany Department, Herbarium) and duplicates in the senior author's personal herbarium, as indicated.

CALYCELLINA THINDII Arendholz & R. Sharma sp. nov.

FIGS. Plate 1: Figs. 1 - 7

Apothecia gregaria, mollia, leviter cupulata ad plana, ad 1 mm diametro. Receptaculum sulphureum, pubescens, in sicco flavum ad stramineum ad electrinum. Hymenium plusminusve planum, sulphureum, in sicco flavum ad stramineum.
Excipulum ectalum ex textura intricata ad textura porrecta, excipulum medullatum ex textura intricata, hyphae dispositae perlate.
Asci octospori, e uncis nati, clavati-cylindracei, apex rotundatus, 80-95 x 9-10 µm, poro jodo caerulescente.
Ascosporae hyalinae, uniseptatae, ellisoideae, 10-11 x 5-5.5 µm, uniseriatae ad irregulariter biseriatae.
Paraphyses filiformes, ramosae, septatae, ad 2 µm latae.
Holotypus. - In ramulo mortuo angiospermo, Chimakothi, Thimphu, Bhutan, R. Sharma, July 27, 1981; PAN 17649, in herbario cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-304.

Apothecia gregarious, soft, sessile, up to 1 mm in diameter.

Receptacle cupulate to plane, downy, sulphur yellow, on drying pure yellow to straw or amber; hymenium concolorous to that of the receptacle.

Ectal excipulum of textura intricata to textura porrecta, up to 20 µm thick, the outermost cells, especially near the margin, are drawn out into small cylindrical, hyaline hairs, up to 15 x 2 µm.

Medullary excipulum of textura intricata, hyphae very loosely arranged.

Asci J+, 8-spored, 80-95 x 9-10 µm, clavate-cylindric, apex round, bases stem-like, arising from croziers.

Ascospores hyaline, ellipsoid, mostly with two large oildrops, one-septate, 10-11 x 5-5.5 µm, uniseriate to irregularly biseriate.

Paraphyses filiform, hyaline, branched, septate, up to 2 µm wide.

Etymology of the specific epithet. - In honour of Prof. Dr. K.S. Thind, Panjab University, Chandigarh, India.

Habitat. - On dead angiospermic twigs.

Type locality. - Chimakothi, Thimphu, Bhutan.

Holotype. - Angiospermous forest, R. Sharma, Juli 27, 1981; PAN 17649, isotype in the senior author's personal herbarium (W.R.A. 1982-304).

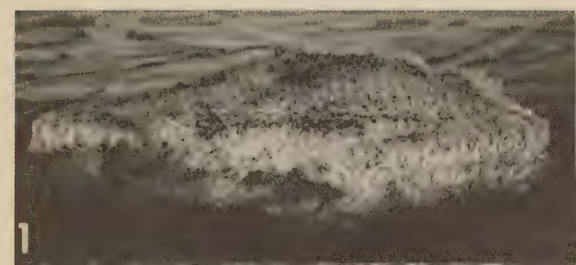
NOTES. - Calycellina thindii seems to be another representative of Calycellina which does not grow on fallen leaves of deciduous trees as do most members of this genus. From C. camelliae Dennis (DENNIS 1971) occurring on dead branches of Camellia sinensis (L.) O.Ktze. it differs in its larger apothecia, asci and the sulphur yellow colour in the fresh condition. Calycellina pulviscula (Cke.) Dennis (DENNIS 1964), another yellow species growing on stems of Phytolacca, differs from Calycellina thindii in having smaller apothecia (0.3 - 0.4 mm in diameter), the much smaller asci

Plate 1

CALYCELLINA THINDII Arendholz & R. Sharma sp. nov.;
PAN 17649

Fig. 1: One apothecium showing downy excipulum; SEM picture, 150 x.
Fig. 2: Downy excipulum; SEM picture, 500 x.
Fig. 3: LS*), showing part of the ectal excipulum near the base; 630 x, DIC.*)
Fig. 4: LS through an apothecium; 160 x.
Fig. 5: Apothecium seen under the stereomicroscope; 47 x.
Fig. 6: LS, part of the hymenium showing asci with ascospores; 630 x, DIC.
Fig. 7: LS, margin of an apothecium; 630 x, DIC.
(photos: W.R. Arendholz)

*) LS = Longitudinal section; DIC = Differential interference contrast



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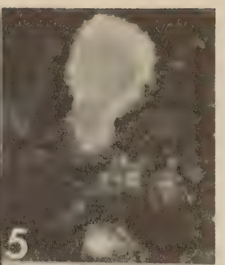

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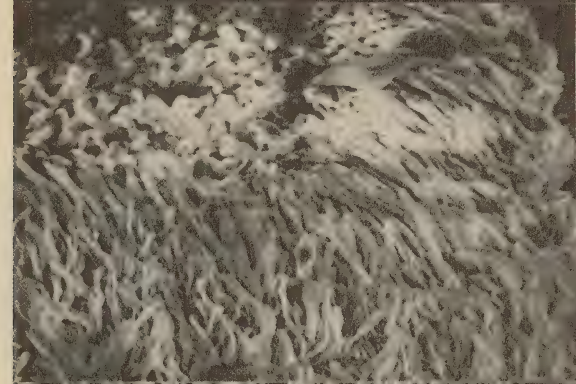

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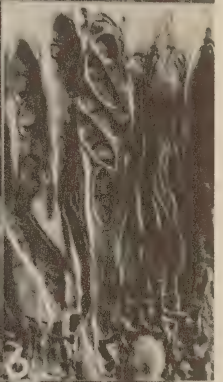

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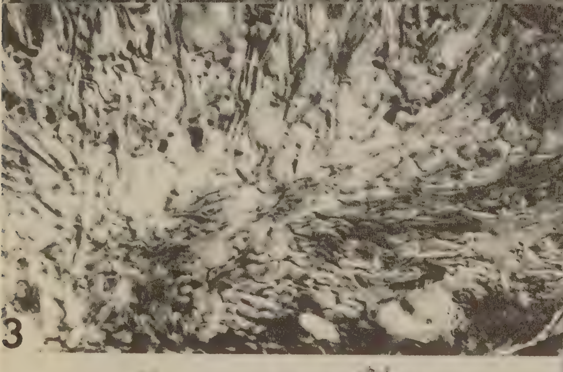

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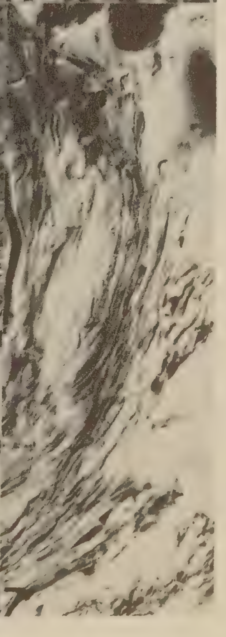

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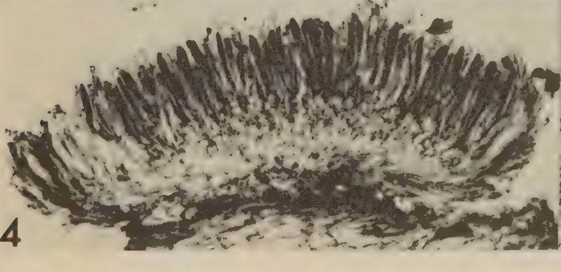

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(up to 33 x 4 µm) and the rod shaped ascospores (5-6 x 0.5 µm). C. ochraceae (Grel. & Croz.) Dennis (DENNIS 1962) resembles with C. thindii in having yellow apothecia but differs in having hairs with finely granulate walls and ascospores 15-20 x 3 µm and ultimately becoming 3-septate. (cf. p.642).

CALYCELLINA MONTANA Arendholz & R. Sharma sp. nov.

FIGS. Plate 2: 3 Figs. 1-4, in each case

Apothecia gregaria, leviter cupulata ad plana, sessilia, ad 1 mm diametro. Receptaculum brunneum, in sicco ferrugineum, margo nitens, minute pubescens. Hymenium in sicco vinoso-bubalinum.
Excipulum ectalum ex textura porrecta, hyalinum, excipulum medullatum ex textura intricata ad porrecta, hyphae plusminusve parallelae ad paginam externam currentes.
Asci octospori, e uncis nati, clavati-cylindracei, apex obtusus, 55-70 x 4-4,5 µm, poro jodo caerulescente.
Ascosporae hyalinae, uniseptatae, ellipsoideae, guttulatae 7-9 x 1.5-3 µm, irregulariter biseriatae.
Paraphyses filiformes, hyalinae, ramosae, septatae, ascos superantes ad 16 µm, ad 1.8 µm latae.
Holotypus. - In ligno emortuo angiospermo, 15 km a Bomdila ad Dirang (alt. 2450 m), West Kameng, Arunachal Pradesh, September 3, 1981, R. Sharma, PAN 17983, in herbario cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-303.

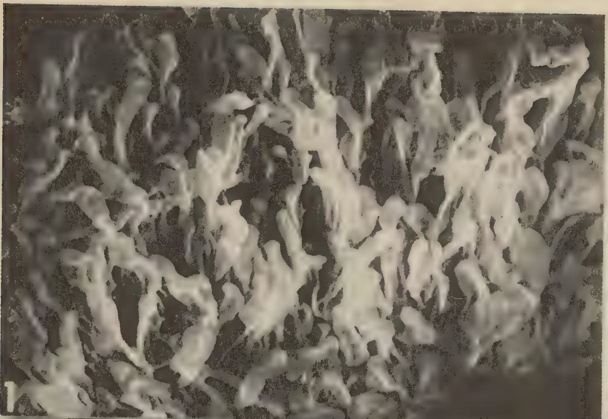
Apothecia gregarious, soft, sessile, up to 1 mm in diameter. Receptacle shallow cupulate to plane, yellowish brown, on drying rust, margin whitish, minutely downy.

Plate 2

CALYCELLINA MONTANA Arendholz & R. Sharma sp. nov.;
PAN 17983

Fig. 1: Downy excipulum; SEM picture, 1200 x.
Fig. 2: Apothecia seen under the stereomicroscope; 47 x.
Fig. 3: Some hairs at the ectal excipulum; SEM picture, 5400 x.
Fig. 4: LS through an apothecium; 160 x, BF.*)
(photos: W.R. Arendholz)

*) BF = bright field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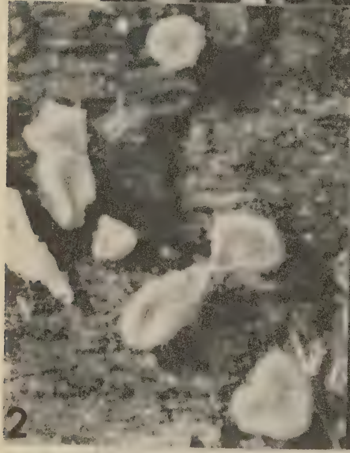
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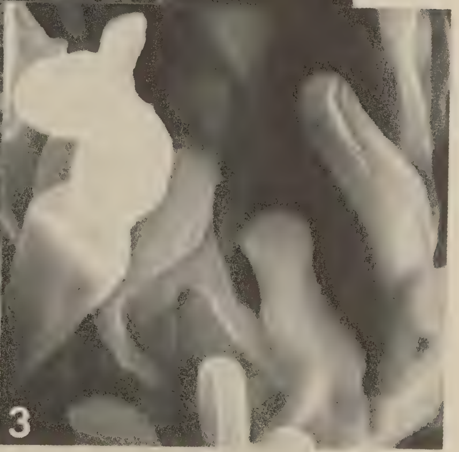
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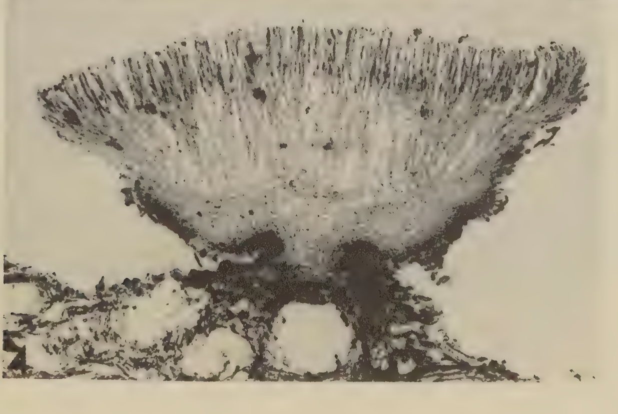
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Hymenium reddish brown, on drying vinaceous buff.

Ectal excipulum of textura porrecta, up to 30 µm thick, hyphae inclined at a small angle to the surface of the apothecium, cells up to 18 x 4 µm, drawn out into hairs. At the base of the apothecium there are some dark coloured cells in the ectal excipulum. Hairs hyaline, nonseptate, small, subclavate, up to 18 x 4 µm.

Medullary excipulum of textura intricata, up to 75 µm thick, hyphae running more or less parallel to the external surface of the apothecium, up to 2.0 µm wide.

Asci J+, 8-spored, 54-75 x 4-4.5 µm, clavate-cylindric, apex obtuse, base stem-like, arising from croziers.

Ascospores hyaline, one-septate, ellipsoid, narrow at the ends, guttulate, guttules small, 7-9 x 1.5-3.0 µm, irregularly biseriate.

Paraphyses filiform, hyaline, branched, septate, up to 2.0 µm wide at the tips, projecting up to 16 µm beyond the tips of the asci.

Etymology of the specific epithet. - Refers to the locality, where the specimen was collected.

Habitat. - On dead angiosperm stem.

Type locality. - 15 km from Bomdila towards Dirang (alt. 2450 m), West Kameng, Arunachal Pradesh.

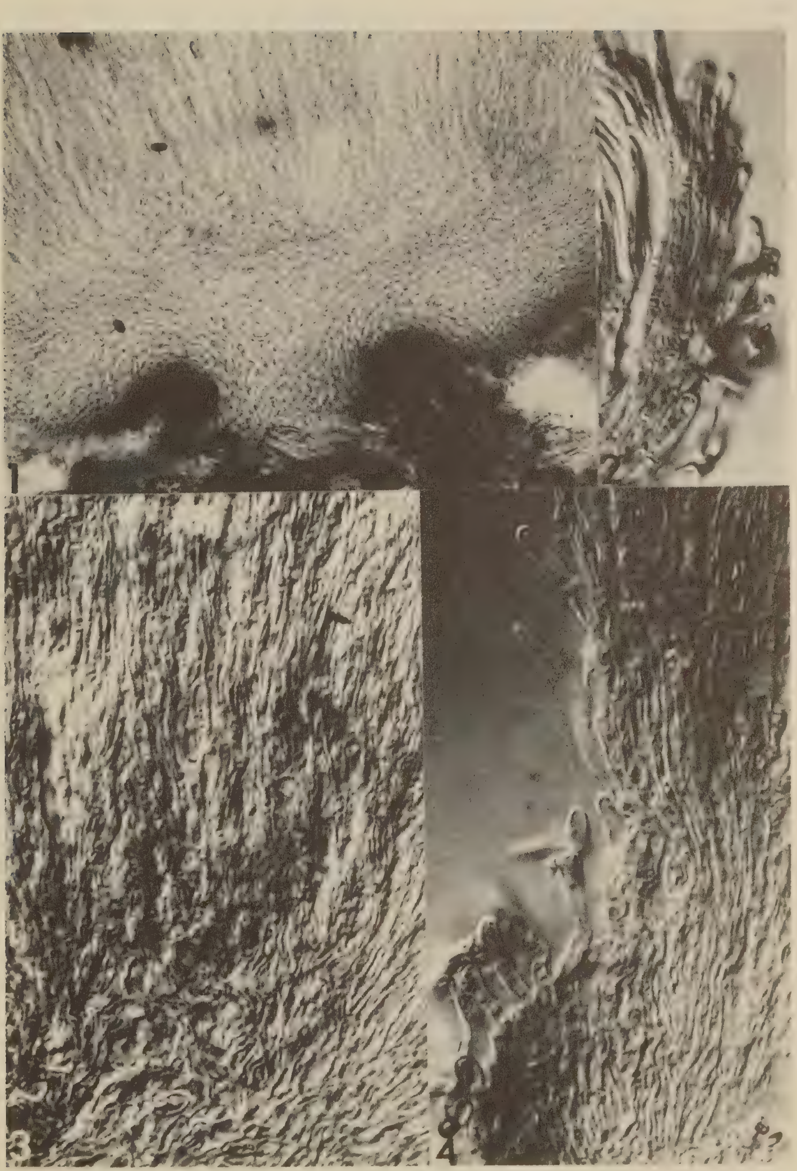
Holotype. - Angiospermous forest, R. Sharma, September 3, 1981, PAN 17983, isotype in the senior author's personal herbarium (W.R.A. 1982-303).

NOTES. - Calycellina montana seems to be an alpine species and differs from all Calycellina species hitherto described growing on angiospermous stems (cf. also notes under Calycellina thindii p. 636).

Plate 3

CALYCELLINA MONTANA Arendholz & R. Sharma sp. nov.;
PAN 17983

Fig. 1: LS, showing ectal and medullary excipulum near the base; 400 x, BF.
Fig. 2: LS, margin of an apothecium; 1000 x, DIC.
Fig. 3: LS, medullary excipulum; 630 x, DIC.
Fig. 4: LS, hairs at the ectal excipulum; 630 x, DIC.
(photos: W.R. Arendholz)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Following is a key to determine the species of Calycellina known from the Indian subcontinent (cf. also THIND & M.P. SHARMA 1980).

1 Apothecia growing on leaves of deciduous trees ... C. populina (Cf. THIND & H. SINGH 1970)
1* Apothecia not growing on leaves of deciduous trees ... 2

2 Apothecia growing on fern remains ... C. minuta (Cf. THIND & M.P. SHARMA 1980)
2* Apothecia not growing on fern remains ... 3

3 Asci 4-spored ... C. tetraspora (Cf. THIND & M.P. SHARMA 1980)
3* Asci 8-spored ... 4

4 Apothecia sulphur yellow, on drying pure yellow to straw, asci 80-95 x 9-10 µm, ascospores 10-11 x 5-5.5 µm ... C. thindii
4* Apothecia brownish, on drying vinaceous buff, asci 55-70 x 4-4.5 µm, ascospores 7-9 x 1.5-3 µm ... C. montana

ENCOELIA HETEROMERA (Mont.) Nannf.

FIGS. Plate 4,5: Figs. 1-5; 1,2,4,6a-b, respectively

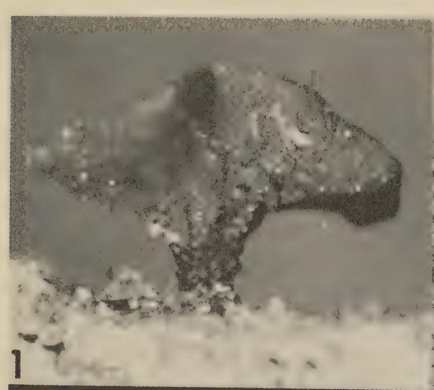
Apothecia scattered to gregarious, cupulate, short stalked, up to 5 mm in diameter, receptacle dark brown, fuscous black to black on drying. Hymenium yellowish green, on drying greyish sepia to hazel. Apothecia yielding a yellowish green pigment in 2-3 % KOH solution.

Excipulum differentiated into two zones: ectal excipulum textura angularis, dark brown, outermost cells clavate,

Plate 4

ENCOELIA HETEROMERA (Mont.) Nannf.; PAN 17923

Fig. 1: Apothecium seen under the stereomicroscope; 19 x.
Fig. 2: Ectal excipulum as seen under the stereomicroscope; 30 x.
Fig. 3; Fig. 4: Ectal excipulum; SEM picture 280 x, 1500 x, respectively.
Fig. 5: LS through an apothecium; 160 x, BF.
(photos: W.R. Arendholz)



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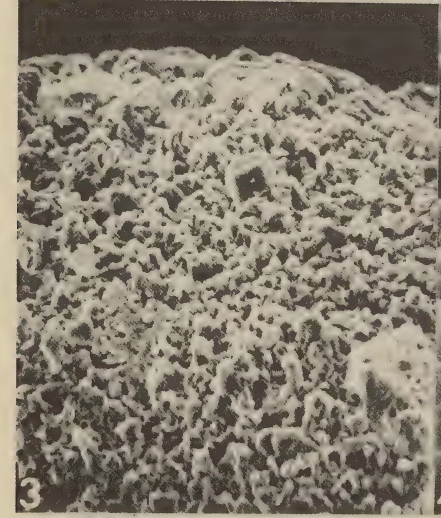

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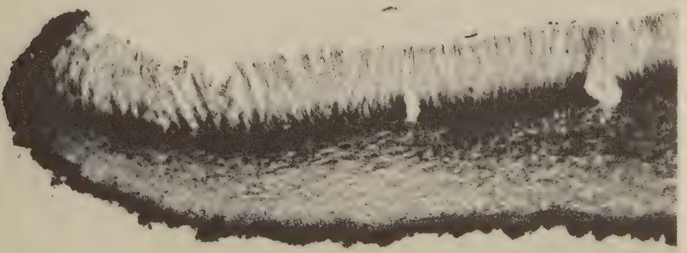

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globose, up to 21 x 11 µm, loosely held; medullary excipulum textura intricata, yellowish brown, hyphae septate, up to 4 µm wide, embedded in a ?gelatinous matrix.

Hypothecium yellowish green, textura intricata, hyphae slightly narrow.

Asci 8-spored, J+, clavate-cylindric, 100-110 x 5.5-6.5 µm apex obtuse, with a stem like base.

Ascospores hyaline, nonseptate, ellipsoid to inequilateral, biguttulate, 7.5-10 x 2-3 µm, uniseriate.

Paraphyses filiform, branched, septate, up to 2 µm wide, projecting up to 8 µm beyond the tips of the asci.

Habitat. - On dead angiosperm log.

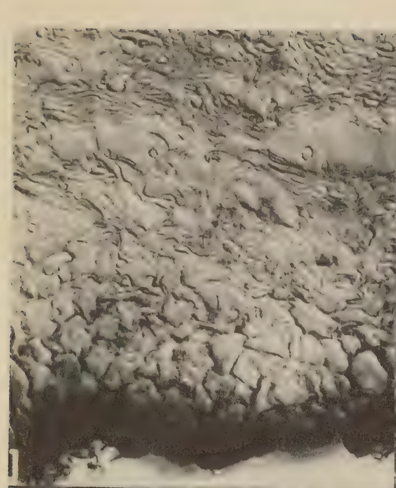
Specimen examined. - Angiospermous forest, 10 km from Bomdila towards Tawang road (alt. 2900 m), West Kameng, Arunachal Pradesh, R. Sharma, August 28, 1981, PAN 17923; part of this collection is also deposited in the senior author's personal herbarium (W.R.A. 1982-302).

NOTES. - We assign this specimen to Encoelia heteromera (Mont.) Nannf. (DENNIS 1954), although the apothecia are smaller (up to 1-2 cm in diameter fide DENNIS), the asci are somewhat larger (110-115 x 8 µm fide DENNIS) and J-. But the anatomical structure and the ascospore characters are nearly identical and both the specimens are yielding a yellowish pigment in KOH solution. In contrast to DENNIS

Plate 5

ENCOELIA HETEROMERA (Mont.) Nannf., PAN 17923: Fig. 1, 2, Fig. 4, 6a-b. ENCOELIA HIMALAYENSIS Arendholz & R. Sharma sp. nov.; PAN 24026: Fig. 3, 5.

Fig. 1: LS through an apothecium showing part of the ectal and medullary excipulum; 630 x, BF.
Fig. 2: LS showing part of the medullary excipulum; 630 x, BF.
Fig. 3: Apothecia seen under the stereomicroscope; 30 x.
Fig. 4a-c: LS, part of the hymenium showing asci and ascospores; 1000 x, DIC.
Fig. 5: Ectal excipulum seen under the stereomicroscope; 30 x.
Fig. 6a-b: LS, showing roughened hyphae of the medullary excipulum; 1000 x, BF, DIC respectively.
(photos: W.R. Arendholz)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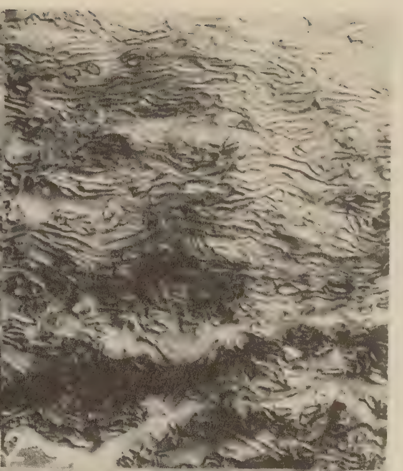
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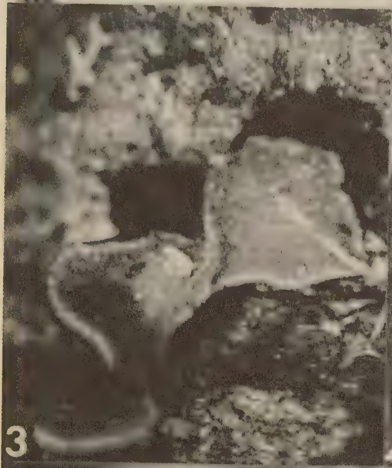
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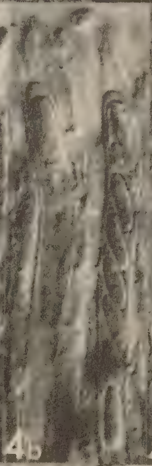
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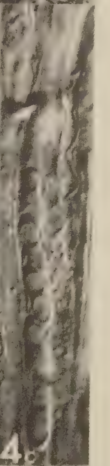
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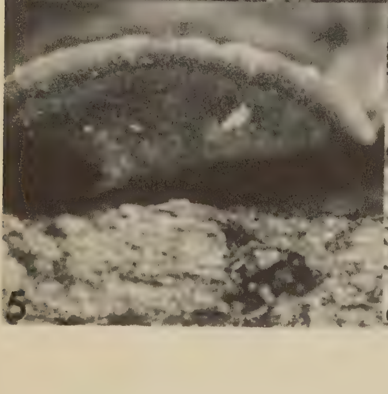
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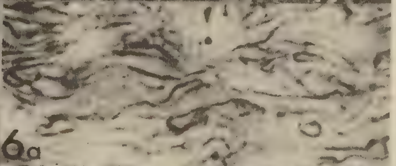
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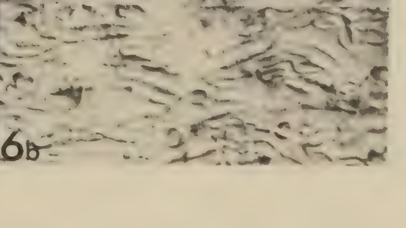
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(1954), KORF & KOHN (1976) describe the ascospores as one-septate. We do not observe any septate ascospores in our specimen.

Ecoelia heteromera is said to be a fungus "widely distributed in the American tropics" (NANNFELDT 1939, p. 239). This seems to be the first report outside this region.

Encoelia papuana Otani (OTANI 1975) is distinguished from our specimen by its larger asci (120-137.5 x 10-11.5 µm) and ascospores (12.5-18 x 5-7.5 µm) and the apothecia yielding a pale purplish pigment in KOH solution.

Together with Encoelia montana Arendholz & R. Sharma (cf. p. 650) and E. himalayensis Arendholz & R. Sharma (cf. p. 648), species of this genus are reported from the Indian subcontinent for the first time.
Following is a key to the Indian species:

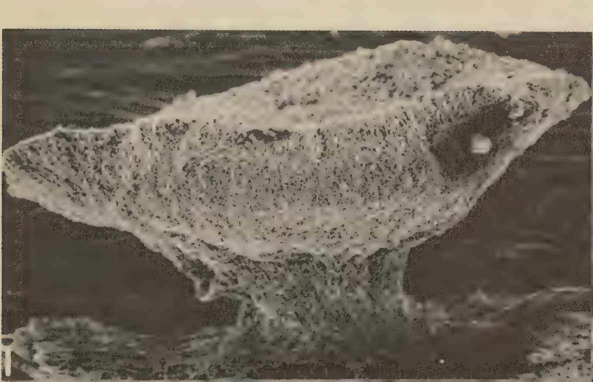
1	Apothecia more than 10 mm in diam. Asci J+, 80-95 x 3.5-4 µm, ascospores up to 9 x 2-3 µm	E. montana
1*	Apothecia less than 10 mm in diam.	2
2	Apothecia yielding a yellowish pigment in 2-3 % KOH solution. Asci J+, 100-110 x 5.5-6.5 µm, ascospores up to 10 x 2-3 µm	E. heteromera
2*	Apothecia not yielding a yellowish pigment in 2-3 % KOH solution. Asci J+, 120-145 x 7.5-9 µm, ascospores up to 16 x 3-3.5 µm	E. himalayensis

Plate 6

ENCOELIA HIMALAYENSIS Arendholz & R. Sharma sp. nov.;

PAN 24026

Fig. 1: Apothecium, total; SEM picture, 73 x.
Fig. 2: Ectal excipulum; SEM picture, 280 x.
Fig. 3: LS through an apothecium; 63 x, BF.
Fig. 4; Fig. 6: Ectal excipulum; 2800 x, 730 x respectively.
Fig. 5: Stem base; SEM picture, 280 x.
(photos: W.R. Arendholz)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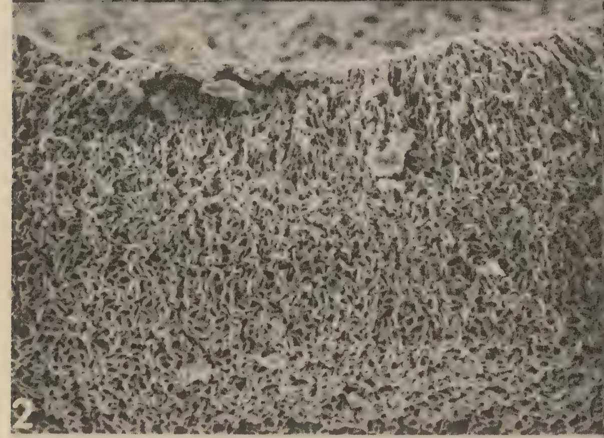
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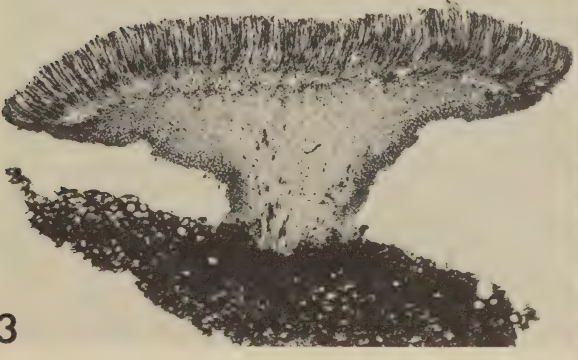
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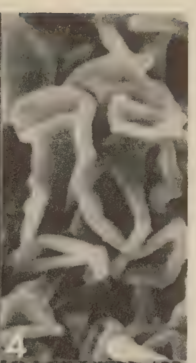
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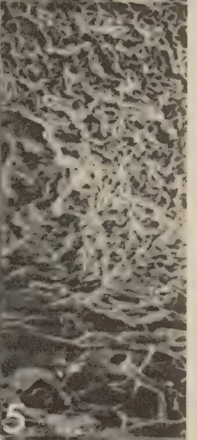
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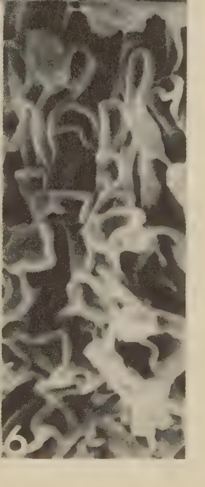
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ENCOELIA HIMALAYENSIS Arendholz & R. Sharma sp. nov.

FIGS. Plate 5,6,7: Figs. 3,5; 1-5; 1-6, respectively

Apothecia gregaria ad coalescentia, leviter cupulata, ad 4 mm diametro. Receptaculum murinum, in sicco umbrinum. Hymenium in sicco avellaneum ad electrinum.
Excipulum ectalum ex textura angularis, brunneum-olivaceum, cellulae extimae, clavatae, globosae ad subglobosae. Excipulum medullatum ex textura intricata, brunneum, hyphae in gelatina inclusae.
Asci octospori, e uncis nati, cylindracei, apex obtusus, 120-145 x 7.5-9 µm, poro jodo caerulescente.
Ascosporae hyalinae, continuae, ellipsoideae, rectae vel leviter curvatae, guttulatae, 11-16 x 3-3.5 µm, uniseriatae.
Paraphyses filiformes, ramosae, septatae, guttulatae, ascos superantes ad 15 µm, ad 2 µm latae.
Holotypus. - In ligno putrescenti, Shergaon (alt. 1680 m), West Kameng, Arunachal Pradesh, R. Sharma, September 8, 1981; PAN 2406, in herbario cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-301.

Apothecia gregarious to coalescing, sometimes in linear rows, up to 4 mm in diameter.

Receptacle shallow cupulate, greyish red, on drying ± umber. Hymenium hazel to umber.

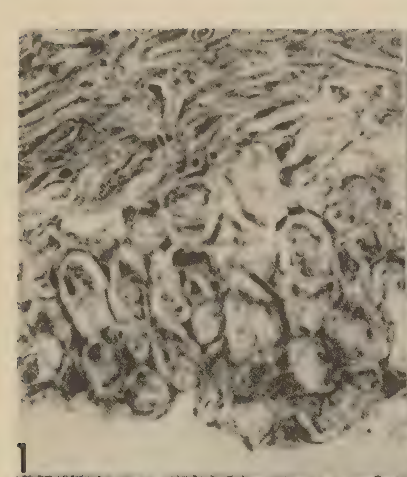
Ectal excipulum of textura angularis to textura globulosa, olivaceous dark brown, outermost cells up to 30 x 18 µm.

Medullary excipulum of textura intricata, up to 255 µm thick, hyphae light brown, up to 4 µm wide. Hypothecium distinct, olivaceous brown, of textura intricata, up to

Plate 7

ENCOELIA HIMALAYENSIS Arendholz & R. Sharma sp. nov.
PAN 24026

Fig. 1: LS, showing ectal excipulum; 1000 x, BF.
Fig. 2: LS, showing part of the stipe and the ectal and medullary excipulum; 160 x, BF.
Fig. 3: LS, showing part of the medullary excipulum; 1000 x, BF.
Fig. 4: LS, showing part of the ectal and medullary excipulum; 630 x, DIC.
Fig. 5: Ascus and some ascospores; 1000 x, DIC.
Fig. 6: margin; 1000 x, BF.
(photos: W.R. Arendholz)



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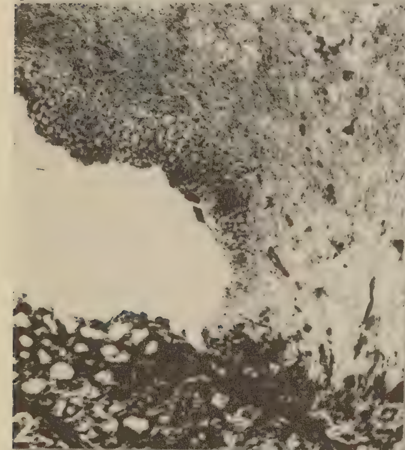

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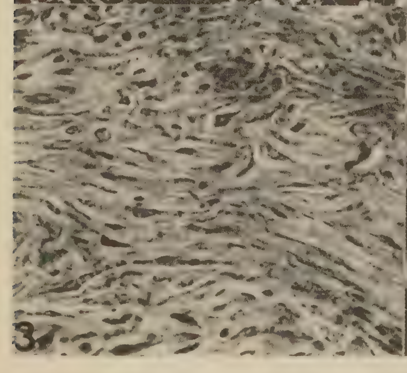

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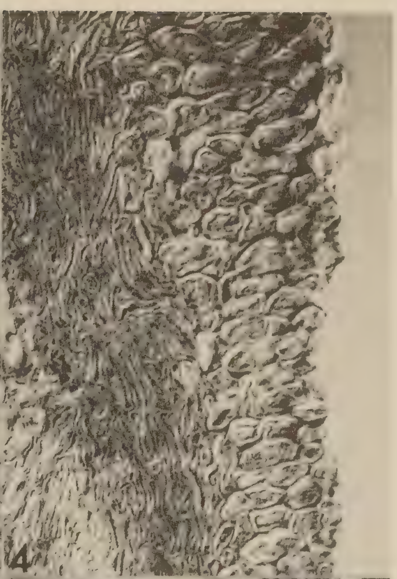

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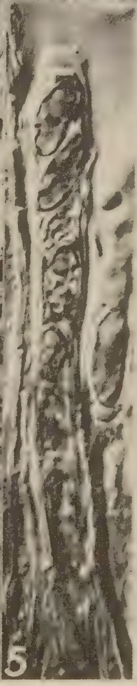

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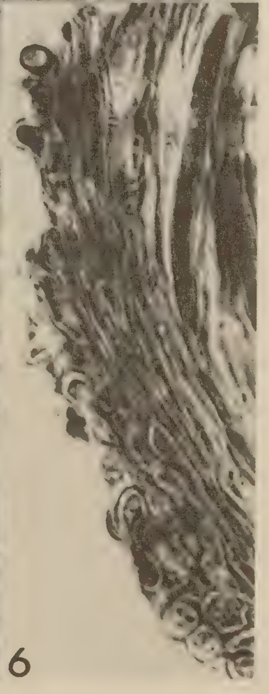

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40 µm thick, hyphae slightly narrower and more compactly arranged than the hyphae of the medullary excipulum.

Asci J+, 120-145 x 7.5-9 µm, cylindrical, apex obtuse, base stem-like, arising from croziers.

Ascospores hyaline, ellipsoid, straight to slightly curved, guttulate, guttules may or may not fill the spore cavity, narrow at both ends, but more towards the lower end, non-septate, 11-16 x 3-3.5 µm, uniseriate.

Paraphyses filiform, hyaline, branched, septate, guttulate, up to 2 µm wide at the tips, projecting up to 15 µm beyond the tips of the asci.

Etymology of the specific epithet. - Refers to the locality, where the specimen was collected.

Habitat. - On decaying angiosperm log.

Type locality. - Shergaon (alt. 1680 m), West Kameng, Arunachal Pradesh.

Holotype. - Angiospermous forest, R. Sharma, September 8, 1981, PAN 24026, isotype in the senior author's personal herbarium (W.R.A. 1982-301).

NOTES. - Encoelia himalayensis may be related to E. papuana Otani, but this species yields a pale purplish stain in 2-3 % KOH solution (cf. also under E. heteromera, p. 646) and shows paraphyses of two kinds: filiform ones up to 1-1.5 µm in diameter and interspersed clavate ones, enlarged up to 5 µm near the apex (OTANI 1975). Furthermore the ascospores are somewhat larger (12.5-18 x 5-7.5 µm).

ENCOELIA MONTANA Arendholz & R. Sharma sp. nov.

FIGS. Plate 8: Figs. 1-8

Apothecia gregaria, leviter cupulata, breviter stipitata mollia, margo elevatus, ad 1,5 cm lata et 5 mm alta. Receptaculum badia, Hymenium fuscum. Excipulum ectalum ex textura angularis ad textura globulosa, brunneum, cellulae extimae clavatae ad subglobosae, formantes cumulos irregularia. Excipulum medullatum ex textura intricata, flavovirens; parietibus cellularum scabris. Asci octospori, e uncis nati, 80-95 x 3.4-4 µm, cylindracei, apex obtusus, pachydermus, poro jodo caerulescente. Ascosporae hyalinae, continuae, ellipsoideae ad leviter

allantoideae, biguttulatae, 6-9 x 2-3 µm, uniseriatae. Paraphyses filiformes, ramosae, septatae, hyalinae, ascos superantes ad 18 µm, ad 3 µm latae.
Holotypus. - In ligno mortuo angiospermo, Wangbasti (alt. 2500 m), Bomdila, Arunachal Pradesh, R. Sharma, August 25, 1981; PAN 17892, in herbario cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-300.

Apothecia gregarious, short-stalked, soft, up to 1.5 cm in diameter and up to 5 mm in total height.

Receptacle shallow cupulate, becoming appressed and irregular later on, margin raised, reddish brown, on drying nearly fuscous black. Hymenium greyish brown, on drying hazel to fawn.

Ectal excipulum of textura angularis to textura globulosa, up to 145 µm thick, dark brown, outermost cells of variable shape, clavate to subglobose, up to 35 x 15 µm, forming irregular heaps on the external surface of the apothecium, easily separated on tapping the slide.

Medullary excipulum of textura intricata, up to 180 µm, yellowish-green, hyphae up to 7.5 µm wide. Hypothecium distinct, brown, up to 40 µm thick, hyphae up to 4 µm wide.

Asci J+, 8-spored, 80-95 x 3.5-4 µm, cylindrical, apex obtuse, slightly flattened, base stem-like, arising from croziers.

Ascospores hyaline, ellipsoid to slightly allantoid, biguttulate, 6-9 x 2-3 µm, uniseriate.

Paraphyses filiform, hyaline, branched, septate, up to 3 µm wide, projecting up to 20 µm beyond the tips of the asci.

Etymology of the specific epithet. - Refers to the locality, where the specimen was collected.

Habitat. - On dead and decaying angiosperm log.

Type locality. - Wangbasti (alt. 2500 m), Bomdila, Arunachal Pradesh.

Holotype. - Angiospermous forest, R. Sharma, August 25, 1981, PAN 17892, isotype in the senior author's personal herbarium (W.R.A. 1982-300).

NOTES. - Encoelia montana very much resembles E. furfuracea (Roth: Fr.) Karst., but in this species the asci are up to 120 x 7 µm (cf. e.g. DENNIS 1978, KARSTEN 1871, REHM 1890 - GROVES & ELLIOT (1971) state the asci (55-)65-100

(-120) x (5.0-) 5.5-7.5 (-9.0) µm and according to TORKELSEN & ECKBLAD (1977) the asci are only up to 90 x 7 µm), the ascospores are biseriate and the paraphyses are swollen to 5-6 µm at the apex.

E. montana also somewhat resembles E. singaporensis Cash & Corner from Singapore (CASH & CORNER 1958), which is said to have apothecia developing from stromata and have asci 55-75 x 4-5.5 µm. The ascospores are uniseriate, too, but measure only 5.5-7 x 3 µm and the paraphyses are 2-2.5 µm wide at the tip.

All three species of Encoelia dealt with in this paper (cf. E. heteromera p. 644 and E. himalayensis, p. 650) were collected in the high mountain region, that is between 1700 m and 2900 m. Hence the new species may represent alpine taxa.

PARACHNOPEZIZA BAMBUSAE Arendholz & R. Sharma sp. nov.

FIGS. Plate 9: Figs. 1-8

Apothecia gregaria, sessilia, cupulata, ad 1 mm diametro. Receptaculum niveum, in sicco immutatum, hirsutum. Pili praelongi, ad 600 x 4 µm, candidi, formantes dentes. Hymenium pallide aurantiacum, in sicco stramineum. Excipulum ectalum ex textura porrecta ad textura intricata, ad 20 µm latum, hyphae perangustae, ad 2 µm diametro. Excipulum medullatum ex textura intricata, hyphae sicut in excipulo ectalo. Asci octospori, e uncis nati, cylindracei-clavati, ad 145 x 9-11 µm, apex truncatus, poro jodo caerulescente.

Plate 8

ENCOELIA MONTANA Arendholz & R. Sharma sp. nov. PAN 17892

Fig. 1: Apothecium seen under the stereomicroscope; 30 x.
Fig. 2: Ectal excipulum; SEM picture, 55 x.
Fig. 3: "Hairs" of the ectal excipulum; SEM picture, 3500 x.
Fig. 4: LS through an apothecium; 63 x, BF.
Fig. 5: LS, showing part of the hymenium; 400 x, DIC.
Fig. 6: Ectal excipulum; SEM picture, 280 x.
Fig. 7: LS, showing part of the ectal and medullary excipulum; 400 x, BF.
Fig. 8: Stump of a stipe of a broken-off apothecium showing da colour of the tissue, as seen under the stereomicrosco 30 x.
Fig. 9: Ectal excipulum seen under the stereomicroscope; 30 x.

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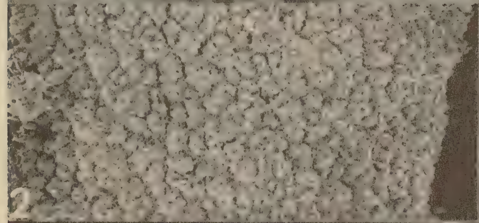

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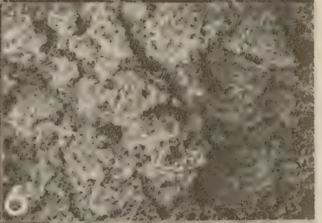

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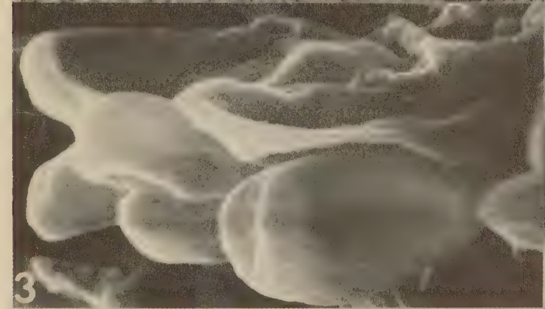

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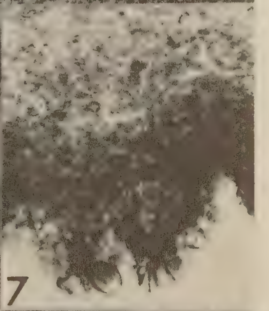

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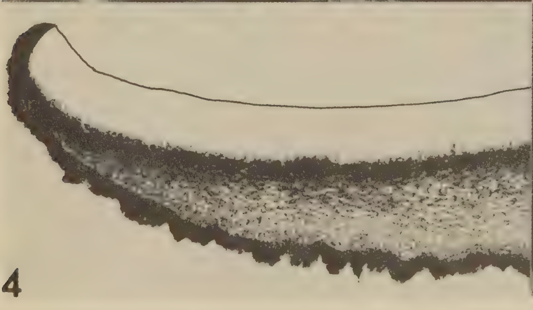

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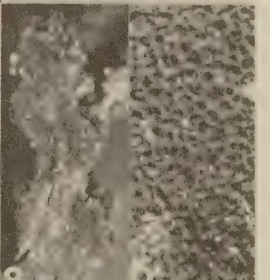

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Ascosporae hyalinae, filiformes, multiguttulatae, ad 105 x 2-4 µm, ad 16-18-septatae. Paraphyses filiformes, hyalinae, ramosae, ad apicem 1 µm latae.
Holotypus. - In culmo emortuo Bambusae, Dugel Dzong, Paro, Bhutan, R. Sharma, August 9, 1981, in herbario W.R.A. 1982-310.

Apothecia gregarious, sessile, cupulate up to 1 mm in diameter. Receptacle snow-white, on drying unchanged, hairy. Hairs very long, up to 600 x 4 µm, thick-walled with thin septa, white, glossy, forming teeth.

Hymenium light orange, on drying straw.

Ectal excipulum of textura intricata to textura porrecta, up to 20 µm wide, hyphae very narrow, up to 2 µm in diameter.

Medullary excipulum of textura intricata, up to 180 µm thick.

Asci J+, 8-spored, up to 145 x 9-11 µm, cylindric-clavate, apex truncate, arising from croziers.

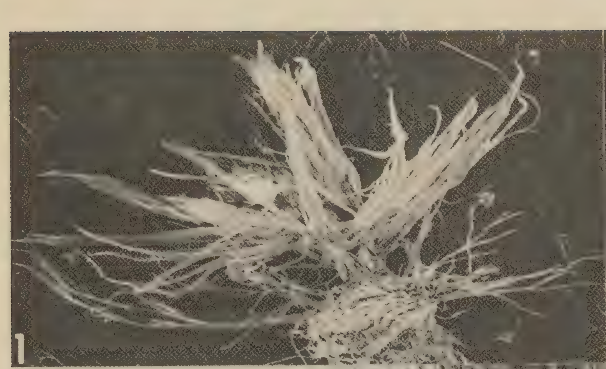
Ascospores hyaline, filiform, multiguttulate, up to 105 x 4 µm, up to 18-septate.

Paraphyses filiform, hyaline, sometimes branched, up to 1 µm wide at the top.

Plate 9

PARACHNOPEZIZA BAMBUSAE Arendholz & R. Sharma sp. nov.
PAN 17797

Fig. 1: Apothecium, total; SEM picture, 73 x.
Fig. 2: Tips of some hairs; SEM picture, 3600 x.
Fig. 3: LS, showing ca. one half of an apothecium; 160 x, BF.
Fig. 4: LS, showing hairs and part of the ectal excipulum; 400 x, BF.
Fig. 5: LS, showing some asci with multiseptate ascospores; 630 x, DIC.
Fig. 6: showing hairs arising from the ectal excipulum; 1000 x, BF.
Fig. 7: Some apothecia seen under the stereomicroscope; 19 x.
Fig. 8: LS, showing some croziers with very young asci; 1000 x, BF.
(photos: W.R. Arendholz)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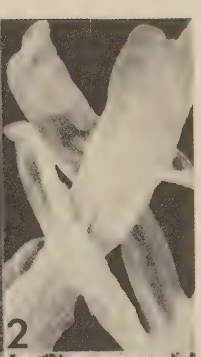
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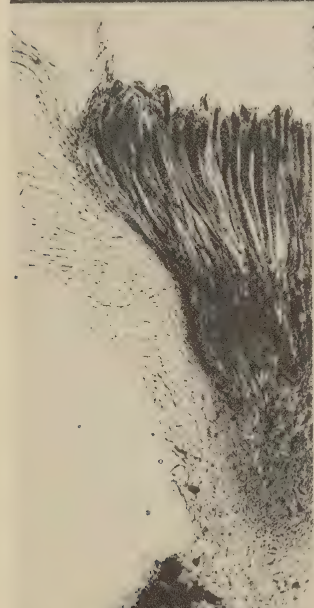
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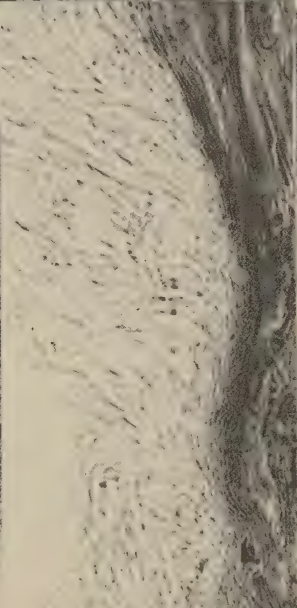
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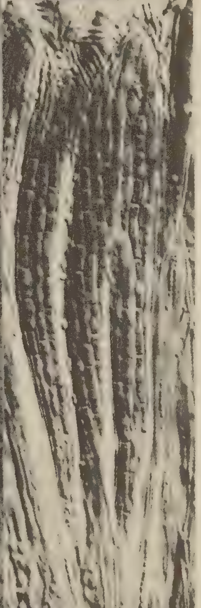
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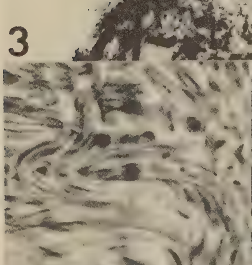
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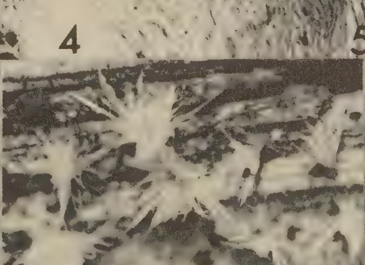
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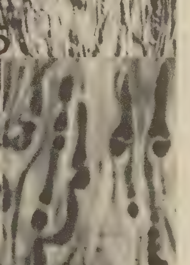
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Etymology of the specific epithet. - Refers to the substrate on which the specimen was collected.

Habitat. - On dead bamboo stems.

Type locality. - Dugel Dzong, Paro, Bhutan.

Holotype. - Mixed forest, R. Sharma, August 9, 1981, in the senior author's personal herbarium (W.R.A. 1982-310).

NOTES. - Because of the structure of the ectal excipulum and the long, not dextrinoid, ± glassy hairs with narrow lumina and the small septa at irregular distances, one would search for this specimen in Hyalopeziza Fuckel subg. Hyalopeziza Fuckel sensu KORF & KOHN (1980). But our specimen has multiseptate, parallel fasciculate ascospores, and the only species of Hyalopeziza with septate ascospores so far described is H. alni Müller on dead wood* of Alnus viridis (Chaix) DC. (MÜLLER 1967, 1977, RASCHLE 1977, BREITENBACH & KRÄNZLIN 1981): The ascospores are said to be one- to two-celled. In this species the hairs are very long, too (up to 270 µm), but they are dextrinoid.

On the surface of the bamboo stem there is a hardly visible hyphal weft, which does not bear the apothecia and which one could interpret as a "false subiculum" sensu KORF (1952, 1978). This character, the structures of the hairs, the asci and the ascospores fit to Parachnopeziza rather than to Hyalopeziza.

Parachnopeziza bambusae resembles very much P. miniopsis (Ellis) Korf (KORF 1978) - the type species of Parachnopeziza, which was studied by the senior author (Ellis: North Amer. Fungi 563; CUP-A) - in size of the apothecia and the hymenial characters, but this species has an ectal excipulum of textura angularis and grows on bark "particularly of Acer and of Vitis" (KORF 1978, p. 470).

P. bambusae is the first record of this genus from the Indian subcontinent and the third species of the genus.

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* The statement: "Hab. in foliis emortuis Alni viridis (Chaix) DC." in the original description (MÜLLER 1967, p. 150) seems to be a mistake, for in MÜLLER (1977, p. 46) he writes: "altes Holz von Alnus viridis (Chaix)DC., 22.9.1965 (Typus)", and RASCHLE (1977, p. 104), who studied the type collection states: "Matrix: Holz und Rinde von Alnus viridis (Chaix)DC.

MOLLISINA UNCINATA Arendholz & R. Sharma sp. nov.

FIGS. Plate 10, 11: Figs. 1-7; 1-4, 6, respectively

Apothecia gregaria, sessilia, leviter cupulata, in sicco profunde cupulata, up to 0.4 mm diametro. Extus minute puberula, pili parvi, plusminusve ramosi, laeves, ad marginem non ramosi, sed uncinati, ad 17 x 2 μm. Receptaculum album, in sicco bubalinum, margo scaber. Hymenium pallide aurantiacum, in sicco luteolum ad ochraceum. Excipulum ectalum ex textura prismatica ad textura porrecta. Excipulum medullatum ex textura porrecta, hyphae dispositae perlate. Asci octospori, e uncis nati, clavati-cylindracei, apex rotundatus, 50-44 x 7-7.5 μm, poro jodo caerulescente. Ascosporae hyalinae, uniseptatae, ad septa constrictae, fusiformes, curvatae, guttulatae, 12-16.5 x 1.5-2 μm, oblique biseriatae. Paraphyses filiformes, simplices, septatae, ad 3 μm latae.
Holotypus. - In paginis ambis foliorum emortuorum Querci incanae, 12 km a Rupa ad Shergaon, Arunachal Pradesh, R. Sharma, September 4, 1981, PAN 17992; in herbario Cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-306.

Apothecia gregarious, small, sessile (to shortly stalked), soft, up to 0.4 mm in diameter, on drying becoming deep cupulate.

Receptacle shallow cupulate, white, on drying buff, minutely downy, margin rough. Hairs small, probable hyphal processes, irregularly branched, mostly with a cell-lumen, up to 9 x 1 μm, at the margin hardly branched, much longer and uncinate, up to 17 x 2 μm, with a cell-lumen, too, somewhat resembling the hairs of Hyaloscypha species. Hymenium light orange, on drying somewhat darker or pale luteous to ochraceous.

Ectal excipulum of textura prismatica to textura porrecta, up to 20 μm thick.

Medullary excipulum of textura porrecta, hyphae very widely arranged.

Asci J+, 40-55 x 7-7.5 μm, clavate-cylindric, apex round, base small flat, arising from croziers.

Ascospores hyaline, fusoid, guttulate, ends round, somewhat curved, 12-16.5 x 1.5-2 μm, 1-septate, constricted at the septa, obliquely biseriate.

Paraphyses filiform, hyaline, septate, simple, uniform in width throughout their length, up to 3 µm wide, tips obtuse. At the base of the short stalk there is often associated a Chalara anamorph.

Etymology of the specific epithet. - Refers to the uncinate hairs at the margin of the apothecium.

Habitat. - On both sides of dead, fallen leaves of Quercus incana Roxb.

Type locality. - 12 km from Rupa toward Shergaon, Arunachal Pradesh.

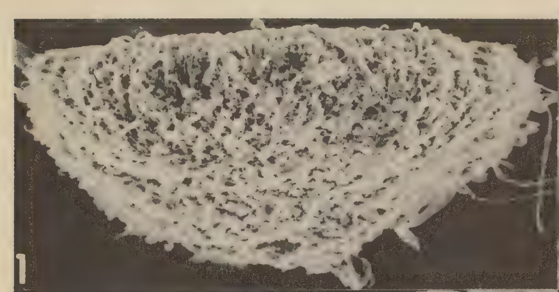
Holotype. - Mixed forest, R. Sharma, September 4, 1981; PAN 17922, isotype in the senior author's personal herbarium (W.R.A. 1982-306).

NOTES. - The two types of hairs and the association with a Chalara anamorph are characteristic of Mollisina uncinata. We classify this specimen in Mollisina, although the branches of the hairs (hyphal processes) are glassy at the tips only and one can follow a cell-lumen in these branches. According to this character Mollisina uncinata resembles very much Dendrotrichoscypha acanthopila Svrcek (SVRCEK 1977). Because of this character the senior author once more studied a specimen of Mollisina acerina (Mout.)v. Höhn. (Sydow Mycoth. germ. 126, JE; cf. plate 11 fig. 5a, 5b) and he was able to find in at least some of the "hyphal processes" a cell-lumen in the light microscope (Differential Interference Contrast). Hence it is possible that Dendrotrichoscypha is synonym of Mollisina, but this has to be proven

Plate 10

MOLLISINA UNCINATA Arendholz & R. Sharma sp. nov.;
PAN 17992

Fig. 1: Apothecium, total; SEM picture, 360 x.
Fig. 1a - 1b: Apothecia seen under the stereomicroscope; 30 x, 47 x, respectively.
Fig. 2, 3: Ectal excipulum showing hairs; SEM picture, 1500, 3500 x respectively.
Fig. 4: LS through an apothecium, at the base a Chalara anamorph (arrow); 160 x.
Fig. 5: LS showing margin, part of the hymenium and of the excipulum with hairs; 400 x, BF.
Fig. 6: LS, part of the ectal excipulum and hairs; 1000 x, DIC.
Fig. 7: LS, margin with hairs; 1000 x, BF.
(photos: W.R. Arendholz)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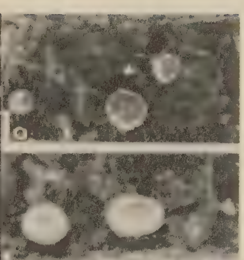

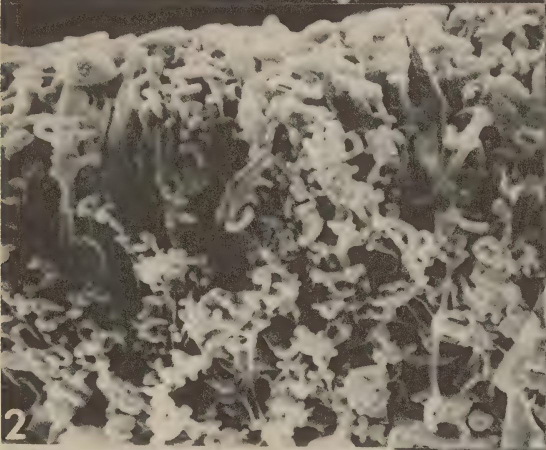
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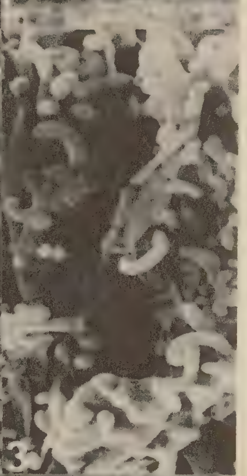
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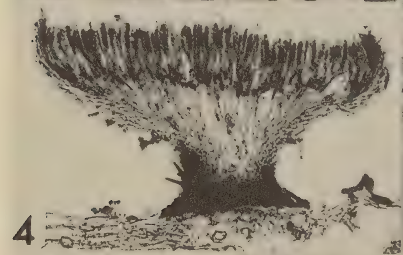
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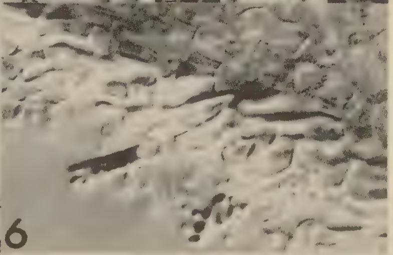
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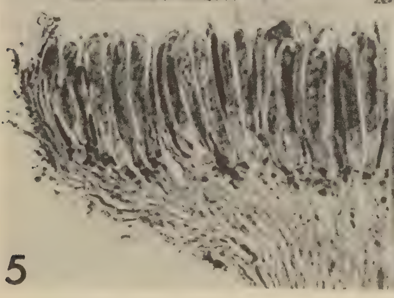
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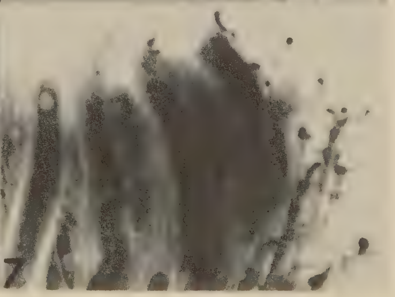
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by more comparative studies, in particular of Dentrotrichoscypha.

Thindiomyces (ARENDHOLZ & R. SHARMA 1983) differs from Mollisina by its ectal excipulum and the much broader branches of the hairs (up to 2-2.5 µm). The ectal excipulum is, by the way, not a textura prismatica with thick-walled hyphae (as stated by ARENDHOLZ & R. SHARMA 1983), but the hyphae are thin-walled and embedded in a gelatinous matrix. These characters are shown clearly in plate 5, fig. 4 and 6 of the cited paper.

MOLLISINOPSIS Arendholz & R. Sharma gen. nov.

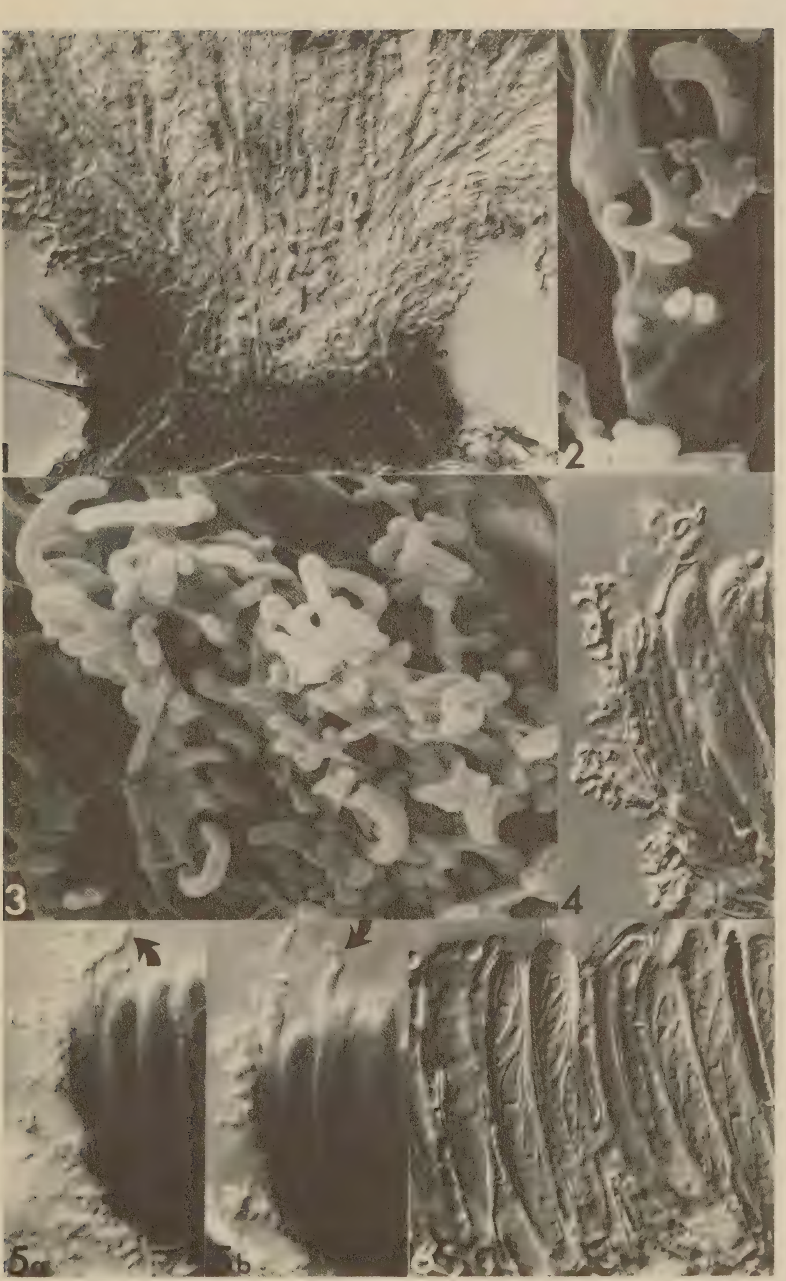
Genus familiae Leotiaceae (Helotiales), apothecia parva, breviter stipitata , receptaculum villosa, pallide colorata, "pili" perparvi, laeves, vitrei, ramosi, probabaliter protuberationes cellularum. Excipulum ectalum ex textura intricata, hyphae undulatae, in gelatina inclusae; excipulum medullatum ex textura intricata, hyphae sicut in excipulo ectalo. Asci octospori, e uncis nati, cylindracei-clavati, poro jodo caerulescente. Paraphyses filiformes, hyalinae, ramosae, septatae, leniter ascos superantes.
Species typica generis. - Mollisinopsis filicis Arendholz & R. Sharma sp. nov.

Etymology of the generic name. - Refers to the appearance in gross morphology of Mollisina.

Plate 11

MOLLISINA UNCINATA Arendholz & R. Sharma sp. nov.: Fig. 1-4, 6; PAN 17992. MOLLISINA ACERINA (Mout.) v. Höhnel: Fig. 5a-5b; Mc. germ. 126 (JE).

Fig. 1: LS, base of an apothecium with a Chalara anamorph showing ectal and medullary excipulum; 630 x DIC.
Fig. 2: "Hairs"; SEM picture, 3500 x.
Fig. 3: Excipulum with "hairs"; SEM picture, 3500 x.
Fig. 4: LS, margin with "hairs"; 1000 x, DIC.
Fig. 5a - 5b: LS, margin with "hairs" showing cell-lumen (arrows); 1000 x, DIC.
Fig. 6: LS, part of the hymenium showing asci with one-septate ascospores; 1000 x, DIC.
(photos: W.R. Arendholz)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5a
5b
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MOLLISINOPSIS FILICIS Arendholz & R. Sharma sp. nov.

FIGS. Plate 12, 13: Figs. 1-7; 1-6, respectively

Apothecia gregaria ad sparsa, mollia, turbinata, breviter stipitata. Receptaculum primo album, ad maturitatem dilute brunneum, in sicco bubalinum, villosa. "Pili" perparvi, laeves, vitrei, ramosi, ad 4 x 1 µm, probabaliter protuberationes cellularum. Hymenium bubalinum. Excipulum ectalum ex textura intricata, hyphae leptodermae, in gelatina inclusae. Excipulum medullatum ex textura intricata, hyphae sicut in exciplo ectalo. Asci octospori, e uncis nati, cylindracei-clavati, apex angustus-rotundatus, poro jodo caerulescente, 30-45 x 5.5 µm. Ascosporae hyalinae, continuae, fusiformes, guttulatae, 5.5-7 x 1-1.5 µm, oblique uniseriatae ad irregulariter biseriatae. Paraphyses filiformes, ramosae, septatae, ascos leviter superantes, ad 1.5 µm latae. Holotypus. - In calamo emortuo filicis, 10 km a Dochula versus Wangdi, R. Sharma, September 11, 1981; PAN 17819, in herbario cryptogamarum universitatis Panjab; isotypus in herbario W.R.A. 1982-311.

Apothecia gregarious to scattered, small, turbinate, soft, shortly stalked, up to 1 mm in diameter and up to 1.5 mm in total height. Receptacle at first white, turning light brown at maturity, somewhat downy, on drying buff. "Hairs" (hyphal processes) branched, smooth, ± glassy, up to 4 x 1 µm, with or without cell-lumen; sometimes these "hairs" are arranged in a radiating manner from small subglobose to pyriform cells up to 15 x 10 µm.

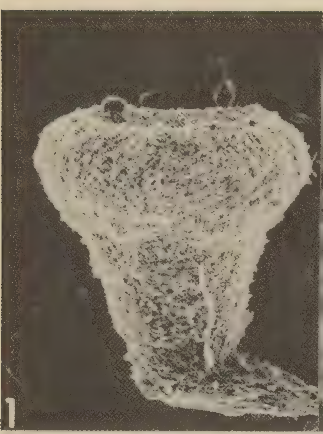
Hymenium plane, buff.

Ectal excipulum of textura intricata, hyphae undulating,

Plate 12

MOLLISINOPSIS FILICIS Arendholz & R. Sharma sp. nov.
PAN 17819

Fig. 1: Apothecium, total; SEM picture, 150 x.
Fig. 2a - 2b: Apothecia seen under the stereomicroscope, side view, top view, respectively; 47 x.
Fig. 3: LS through an apothecium; 160 x, BF.
Fig. 4a - 4b: LS, hyphal processes with cell-lumina (arrows); 1600 x, BF.
Fig. 5-7: Ectal excipulum showing hyphal processes; SEM pictures, 2000 x, 5400, 7200 x.
(photos: W.R. Arendholz)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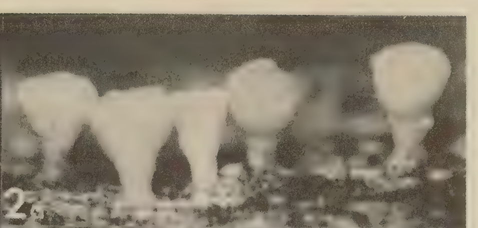
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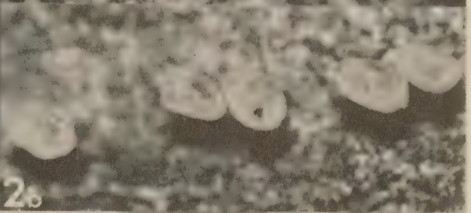
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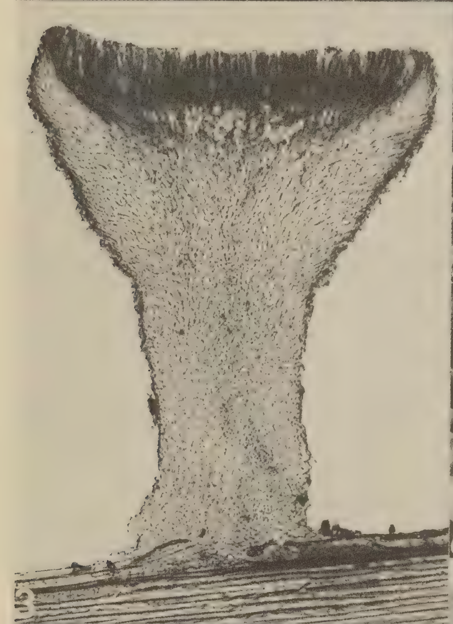
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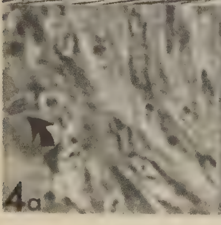
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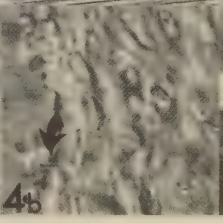
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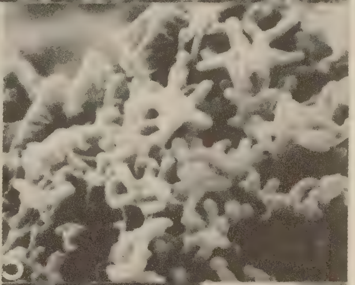
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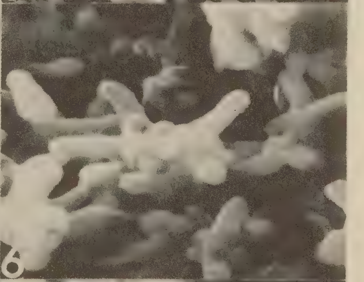
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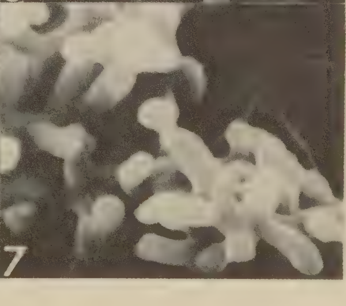
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thin-walled, embedded in a gelatinous matrix, up to 90 µm thick, hyphae running more or less parallel to the surface of the apothecium, up to 4 µm wide, becoming narrow at the margin.

Medullary excipulum of textura intricata, hyphae thin-walled, embedded in a gelatinous matrix, up to 80 µm thick, hyphae up to 4 µm wide. Hypothecium of textura intricata, up to 36 µm thick, hyphae narrow, up to 2 µm wide. In the medullary region there are present sometimes thin-walled, subglobose to irregularly shaped cells up to 20 x 12 µm.

Asci J+, 8-spored, 30-34 x 5.5 µm, cylindric-clavate, apex narrow, round, with a short stem-like, curved base, arising from croziers.

Ascospores hyaline, guttulate, 5.5-7 x 1-1.5 µm, fusoid, ends round, obliquely uniseriate to irregularly biseriate.

Paraphyses filiform, hyaline, branched, septate, up to 1.5 µm throughout their length, slightly projecting beyond the tips of the asci.

Etymology of the specific epithet. - Refers to the substrate, on which the specimens were collected.

Habitat. - On dead fern stipes.

Type locality. - 10 km from Dochula towards Wangdi, Bhutan.

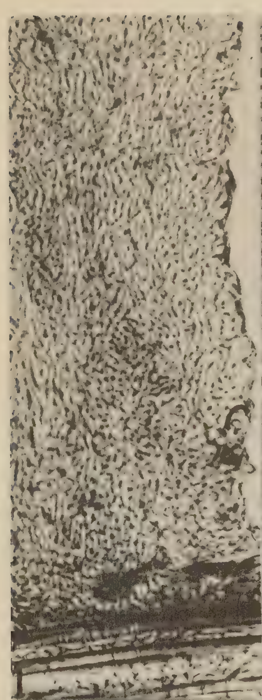
Holotype. - Angiospermous forest, September 11, 1981, R. Sharma, PAN 17819, isotype in the senior author's personal herbarium (W.R.A. 1982-311).

Specimens examined. - The holotype PAN 17819; PAN 17784: mixed forest, on way to Faizuddin, Arunachal Pradesh, R. Sharma, August 6, 1981; part of this collection is also de-

Plate 13

MOLLISINOPSIS FILICIS Arendholz & R. Sharma gen. et sp. nov.
PAN 17819: Fig. 1-3, 6; PAN 17784: Fig. 4,5a-b.

Fig. 1: LS showing ca. one half of the stipe; 400 x, BF.
Fig. 2, 3: LS, excipulum with "hairs"; 630 x, BF, 1000 x, DIC, respectively.
Fig. 4: LS, margin and part of the excipulum; 400 x, BF.
Fig. 5a-5b: LS, "hairs" arising from the excipulum hyphae (arrows); 1000 x, DIC.
Fig. 6: LS, margin, part of the hymenium and of the excipulum; 400 x, DIC.
(photos: W.R. Arendholz)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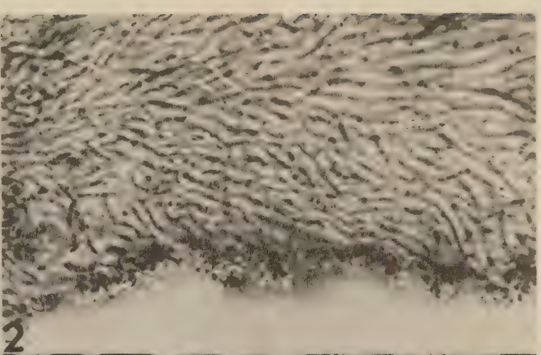
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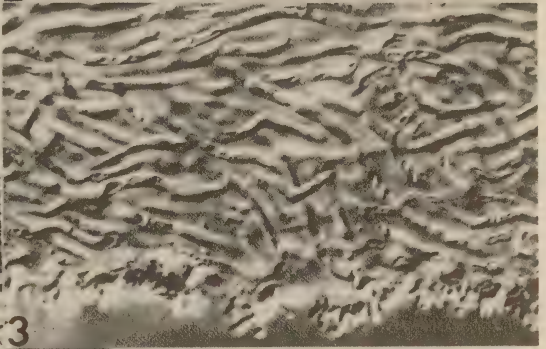
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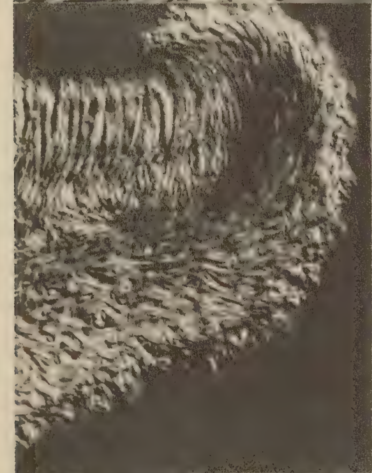

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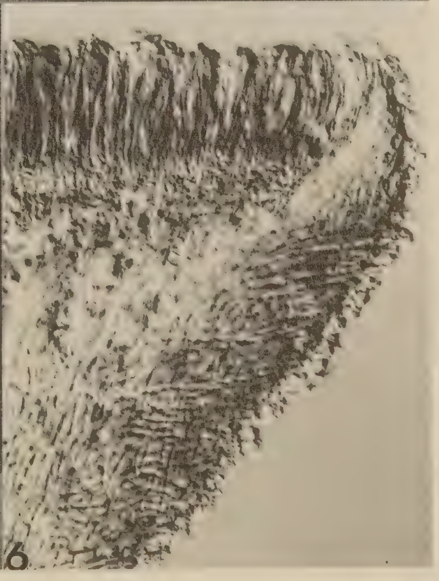
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posited in the senior author's personal herbarium (W.R.A. 1982-312).

NOTES. - Because of its anatomical characters - ectal excipulum and medullary excipulum of textura intricata with thin-walled hyphae immersed in a gelatinous matrix - one would search for this specimen in Bisporella, were it not for the ± glassy hyphal processes as in Mollisina. In PAN 17819 these processes only rarely show a cell-lumen, whereas in PAN 17784 a cell-lumen is there regularly. Nevertheless we consider both specimens as conspecific, because e.g. in Mollisina acerina (Mout.) v. Höhnel in the same fungus there are processes with and without cell-lumina (cf. p. 658). On grounds of the wholly different anatomical characters we do not assign these specimens to Mollisina, for the characteristic hyphal processes seem to have been developed in different tribes convergently. Hence the authors establish the new genus Mollisinopsis. This genus differs from Thindiomyces by its much smaller, branched "hairs" and the thin-walled undulating and interwoven hyphae, which are embedded in a gelatinous matrix.

In Crocicreas panici (v. Höhnel) S.E. Carpenter the outermost walls of the ectal excipulum are described as "minutely branched and appearing cristulate" (CARPENTER 1981, p. 158). During his studies of Pezizella Fuckel the senior author studied a part of the holotype of Belonioscypha miniata, which CARPENTER (1981) synonymized with Crocicreas panici. In those species the senior author could not observe the above mentioned "cristulate walls", but the surface of the ectal excipulum is covered with many small crystals, which are birefringent as revealed by the polarizing microscope.

In Mollisina indica Arendholz & R. Sharma the hyphal processes are also provided with cell-lumina and the hyphae of the excipulum, especially in the ectal excipulum, are embedded in a gelatinous matrix and inclined at an acute angle to the surface of the apothecium. The excipulum, which was erroneously described by us (ARENDHOLZ & R. SHARMA 1983), is of textura intricata with thin-walled hyphae. The structure of the excipulum, the "hairs" with cell-lumina and similar hymenial characters justifies a transfer of Mollisina indica to Mollisinopsis:

Mollisinopsis indica (Arendholz & R. Sharma) Arendholz & R. Sharma comb. nov.

Basionym: Mollisina indica Arendholz & R. Sharma, Mycotaxon 17 (1983): 492

Hence Mollisina uncinata (cf. p. 657) is the only known record of this genus from the Indian subcontinent up to now.

LAMBERTELLA TAXONOMIC SP. I

FIGS. Plate 14: Figs. 1-7

Apothecia scattered, gregarious, stipitate, regular, shallow cupulate to plane and finally reflexed, up to 2 mm in diameter and 2 mm in total height. Receptacle light brown, on drying buff to honey, tomentose. Hairs irregularly branched, cylindrical, septate, somewhat light brown, up to 80 x 3.5 µm, with obtuse tips.

Hymenium light pink, on drying ochraceous to fulvous.

Ectal excipulum of textura intricata having the tendency to become textura prismatica, 25 µm thick, hyaline, cells thin-walled, 14 x 5.5 µm, inner few layers are formed of parallel, septate hyphae, 3.5 µm in diameter.

Medullary excipulum of textura intricata, 36-40 µm thick, with loosely arranged hyphae, 3.5 µm in diameter.

Asci J+, 8-spored clavate-cylindric, 72-80 x 9-11 µm, apex round, up to 2.5 µm thick, with a stem like base, arising from croziers.

Ascospores hyaline, sometimes one-septate, ellipsoid to cylindrical, 11-12.5 x 4.5 µm, uniseriately or biseriately arranged in the ascus.

Paraphyses filiform, hyaline, branched, septate, up to 2 µm wide at the tips, projecting up to 20 µm beyond the ascal tips.

Habitat. - On dead, fallen and dried stems of some members of Rosaceae.

Specimens examined. - Angispermous hedges in the forest, along road side, Samana, Darjeeling (West Bengal), R. Sharma, August 27, 1980, PAN 17438; part of this collection is also deposited in the senior author's personal herbarium (W.R.A. 1982-305).

NOTES. - With some hesitation we assign this specimen to Lambertella, although we could not find neither a substratal stroma nor pigmented ascospores. Hence we defer to establish a new species at this time. But the micro-anatomy, the thickened apex with the large J+ pore of the asci and the structure of the ascospore strongly suggest this genus. The irregularly branched hairs of this specimen giving the receptacle the tomentose outward appearance are particularly striking. Similar but less branched hairs are figured by DUMONT (1971) for Lambertella boliviana Dennis, L. cornimaris v.Höhn., L. malesinana Dumont and L. tewari Dumont. In gross morphology Lambertella sp. I resembles a Pezicula, but the species of this genus have a very different anatomical structure and the asci and spores are much larger in general.

LAMBERTELLA cf. AURANTIACA Tewari & Pant

FIGS. Plate 15: Figs. 1-6

Apothecia gregarious, stalked, soft, cupulate, margin inrolled, up to 2.5 mm in diameter and 5 mm in total height. Receptacle hairy, olive black, on drying fuscous black. Hymenium olive yellow, on drying nearly fuscous black. Hairs short, cylindrical, up to 75 x 4.5 µm, scattered as well as in groups, brown due to the deposition of some amorphous matter.

Ectal excipulum of textura angularis, cells brownish, up to 22 x 19 µm; medullary excipulum of textura intricata, hyphae septate, simple to branched, roughened, up to 4 µm wide.

Asci 8-spored, J-, 70-85 x 5.5-6 µm, clavate-cylindric, apex round, base stem-like, arising from croziers.

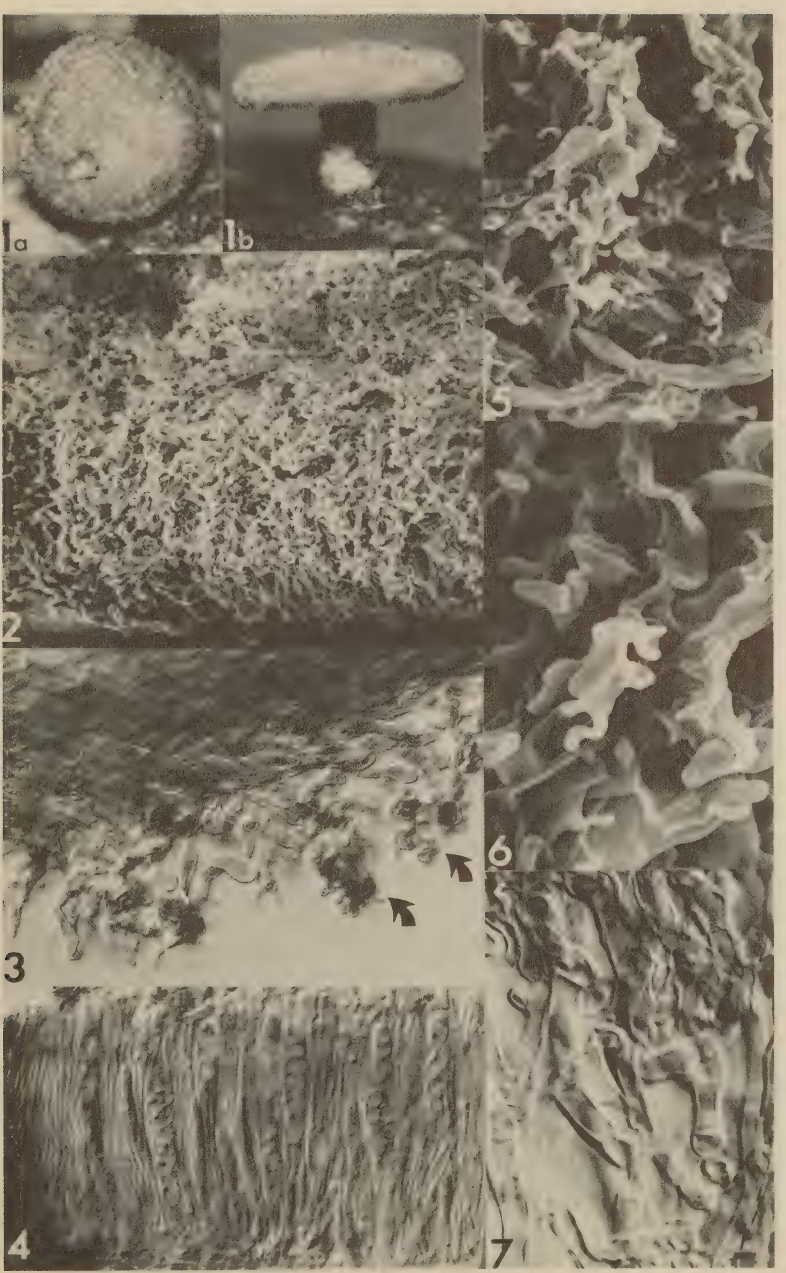
Ascospores hyaline, turning dark brown, biguttulate, ellipsoid, 5.5-11 x 2.5-5.5 µm, uniseriate.

Paraphyses filiform, branched, septate, up to 1.5 µm wide at the tips.

Plate 14

LAMBERTELLA TAXONOMIC sp. I; PAN 17438

Fig. 1a-1b: Apothecia seen under the stereomicroscope, top view, side view, respectively; 30 x.
Fig. 2: Ectal excipulum; SEM picture, 280 x.
Fig. 3: LS showing part of the ectal excipulum and the hairs (arrows); 630 x, DIC.
Fig. 4: LS, part of the hymenium; 400 x, DIC.
Fig. 5, 6: Hairs; SEM pictures, 1200 x, 2800 x respectively.
Fig. 7: LS, part of the medullary excipulum; 1000 x, DIC.
(photos: W.R. Arendholz)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Habitat. - On dead angiospermic stump.

Specimens examined. - Mixed forest Dugel Dzong, Ha, Thimphu, Bhutan, September 27, 1980, R. Sharma; PAN 17592; a part of this collection is also deposited in the senior author's personal herbarium (W.R.A. 1982-309).

NOTES. - Our specimen fits fairly well in the variation range of Lambertella aurantiaca Tewari & Pant (DUMONT 1971; TEWARI & PANT 1967), although the ascospores are not punctate and the asci are J-. If the missing punctuation proves to be constant in new collections this specimen may be worth varietal rank. It is the third record of L. aurantiaca from the Indian subcontinent.

There are three other species with eight spored asci, J- (DUMONT 1971), but these do not match our specimen, that is: Lambertella tetrica (Quêlet)Dumont on fallen leaves of Hedera helix L. with ascospores 20-23 x 4-5 µm and asci 95-110 x 10-12 µm, L. rhamnicola (Batra) Dumont on leaves of Rhamnus virgata Roxb. with punctate ascospores 15-19 x 5 µm and asci 100-125 x 9-11 µm and L. brunneola (Patouillard) Le Gal on unidentified leaves with smooth ascospores 13-14.5 x 4-5 µm and asci 85-110 x 8-10 µm.

MOLLISIA cf. MELALEUCA (Fr.) Sacc.

FIGS. Plate 16, 17: Figs. 4-6; 1-3, respectively

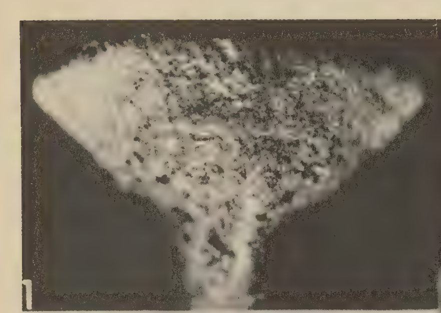
Apothecia gregarious, soft, shallow cupulate, sessile, up to 1.5 mm in diameter. Receptacle minutely downy, brown, on drying nearly fuscous black, margin whitish. Hymenium on drying buff to vinaceous buff or smoky.

Ectal excipulum of textura angularis to textura globulosa, pigmented brown, cells up to 22 x 15 µm, sometimes drawn out into 1(-3)-celled, clavate hairs, walls somewhat wavy,

Plate 15

LAMBERTELLA cf. AURANTIACA Tewari & Pant; PAN 17592

Fig. 1, 2: Apothecia seen under the stereomicroscope, side view, top view, respectively; 47 x.
Fig. 3: LS through an apothecium; 63 x, BF.
Fig. 4, 5: Outermost hyphae of the ectal excipulum; SEM pictures, 1500 x, 7200 x respectively.
Fig. 6: LS, asci and ascospores; 1000 x, DIC.
(photos: W.R. Arendholz)



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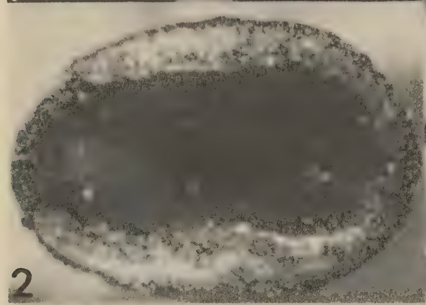

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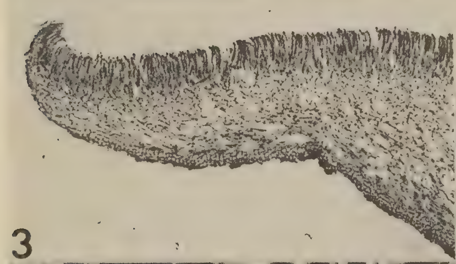

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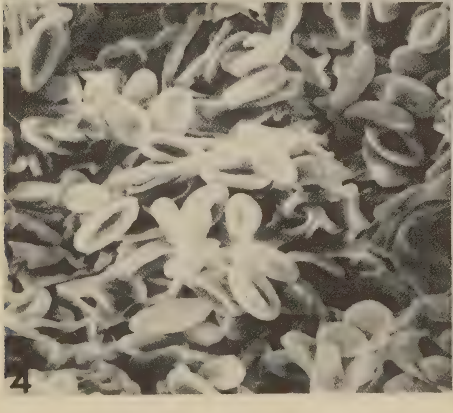

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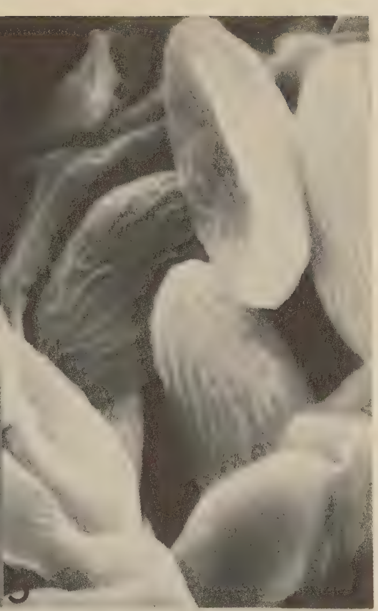

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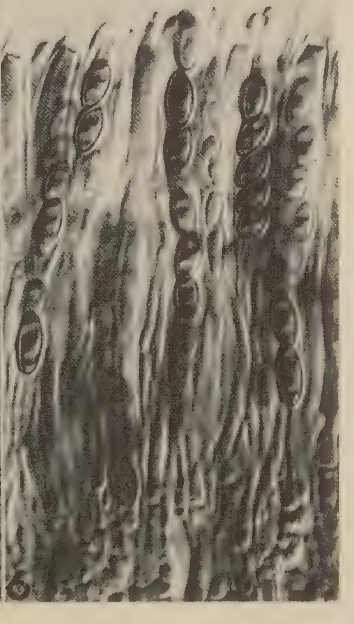

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at the margin up to 54 x 8 µm.

Medullary excipulum of textura intricata, hyphae hyaline, septate, up to 3 µm wide.

Asci 8-spored, J+, 40-55 x 5-5.5 µm, cylindrical, apex round, base stem-like, arising from croziers.

Ascospores hyaline, ellipsoid, broader at the upper end, narrow at the lower end, biguttulate, 7-10 x 1.5-2 µm, irregularly biseriate.

Paraphyses filiform, branched, septate, up to 3 µm wide at the top, narrow below.

Habitat. - On bark of some spiny angiospermic stem.

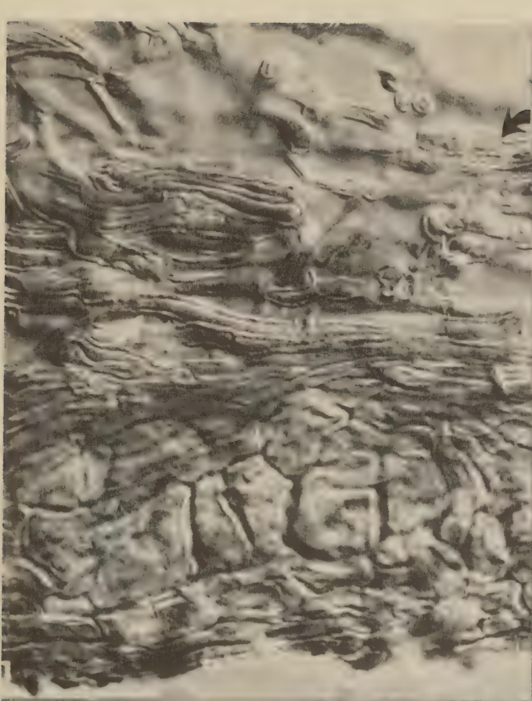
Specimens examined. - Mixed forest, 5 km from Shergaon towards Kalaktang (alt. 1680 m), West Kameng, Arunachal Pradesh, R. Sharma, September 7, 1981; a part of this collection is also deposited at the senior author's personal herbarium (W.R.A. 1982-308).

NOTES. - This specimen resembles very much Mollisia melaleuca (Fr.) Sacc., but this is said to have a whitish disc and the ascospores are somewhat larger (8-14 µm x 1.5-2.5 µm; DENNIS 1978, REHM 1892). It resembles also Mollisia sublividula (Nyl.) Sacc., but this species has only apothecia up to 1 mm in diameter and the ascospores are much

Plate 16

LAMBERTELLA cf. AURANTIACA Tewari & Pant; PAN 17592: Fig.: 1-3; MOLLISIA cf. MELALEUCA (Fr.) Sacc.; PAN 24082: Fig.: 4-6a - c:

Fig. 1: LS showing ectal and medullary excipulum, the hyphae of the medullary excipulum are rough; (arrows); 1000 x, DIC.
Fig. 2: A stump of a stipe of a broken-off apothecium showing the dark coloured ectal and the light coloured medullary excipulum, as seen under the stereomicroscope; 47 x.
Fig. 3: Medullary excipulum with roughened hyphae in the stipe; 630 x, DIC.
Fig. 4: Part of an apothecium; SEM picture, 150 x.
Fig. 5: Apothecium seen under the stereomicroscope; 30 x.
Fig. 6a - c: Outermost hyphal tips of the ectal excipulum; SEM pictures, 1500 x, 360 x, 2800 x.
(photos: W.R. Arendholz)



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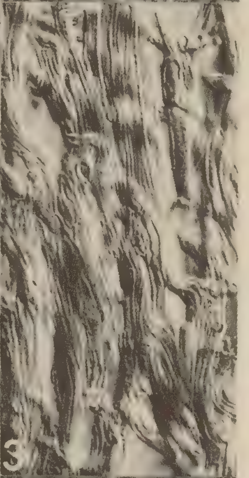

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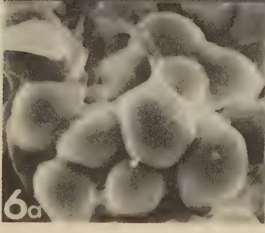
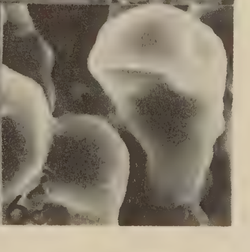


6a

b



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smaller (4-6 x 1-1.5 µm; DENNIS 1958, NYLANDER 1869). We defer from describing a new species because there are so many "species" described in this genus hitherto, and it is difficult, if not nearly impossible to determine "Mollisias" without an urgently wanted modern revision of this genus (cf. also GREENLEAF & KORF 1980).

CIBORIA PECKIANA (Cooke) Korf f. GIGASPORA (Korf) Korf

FIGS. Plate 17, 18: Figs. 4-6; 1-4, respectively

Apothecia scattered, stipitate, soft, fleshy, cupulate, up to 5 mm in diameter and up to 2.5 mm in total height, base stromatized. Receptacle and hymenium brown chamois, on drying chestnut to fuscous black; external surface of the receptacle tubercled.

Ectal excipulum of textura angularis, up to 60 µm thick, hyaline, cells up to 21 x 18 µm, few outermost cells at places forming tubercles at the external surface which are olivaceous brown, up to 72 x 40 µm, cells various shaped, up to 25 x 20 µm, becoming elongated, cylindrical with apices somewhat enlarged, towards the margin up to 40 x 7.5 µm, margin not raised.

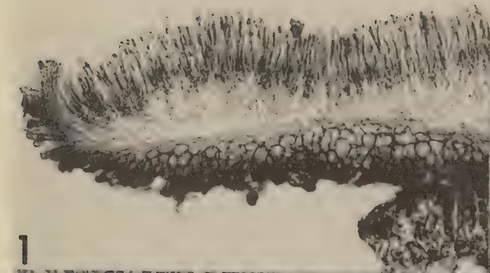
Medullary excipulum of textura intricata, hyaline, up to 288 µm thick, hyphae septate, up to 10 µm wide, compactly arranged; hypothecium indistinct.

Stalk: Ectal excipulum of textura angularis up to 40 µm thick, cells up to 14 x 8 µm, with their axes at right angle to the stalk axis, forming small tubercles at places; medullary excipulum textura intricata, hyphae somewhat nar-

Plate 17

MOLLISIA cf. MELALEUCA (Fr.) Sacc.; PAN 24082: Fig.: 1-3
CIBORIA PECKIANA (Cooke) Korf f. GIGASPORA (Korf) Korf
PAN 17536; Fig.: 4-6a-b

Fig. 1: LS showing one half of an apothecium; 160 x, BF.
Fig. 2: LS, ectal and medullary excipulum; 630 x DIC.
Fig. 3: LS, margin; 1000 x, DIC.
Fig. 4a-b: LS showing some ascospores, in part with secondary spores (arrow); 1000 x, DIC.
Fig. 5: One apothecium seen under the stereomicroscope; 12 x.
Fig. 6: LS, margin and part of the hymenium; 400 x, DIC.
(photos: W.R. Arendholz)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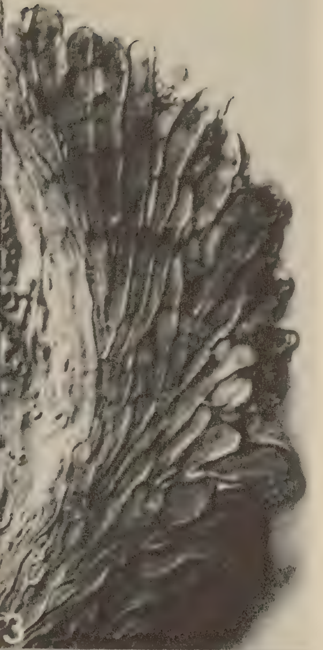
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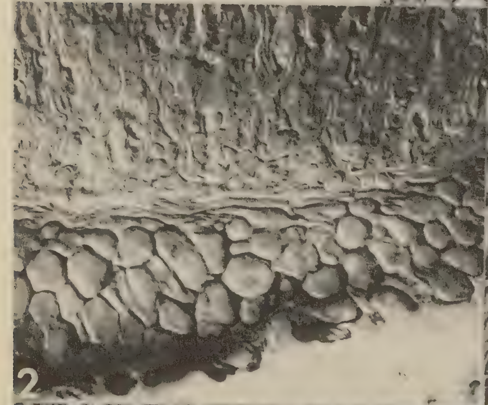
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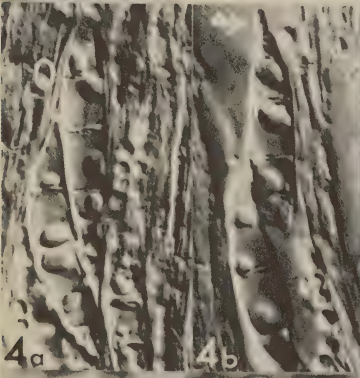

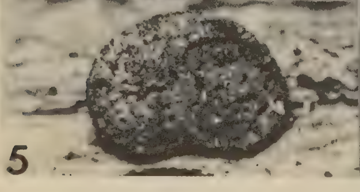
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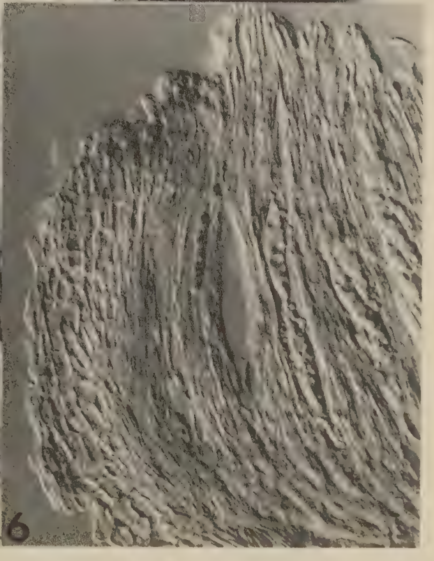
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rower than in the medullary excipulum of the ascigerous region.

Asci 8-spored, J+, 145-180 x 10-11 µm, clavate-cylindric, apex obtuse, base stem-like, arising from croziers.

Ascospores hyaline, 21-50 x 7-8 µm, cylindric when young becoming fusoid to cylindric-fusoid at maturity, straight or curved, non septate at first, becoming multiseptate (6- up to 8-septate) later on, obliquely biseriate above, uniseriate below to obliquely uniseriate, overlapping, budding off hyaline, minute, ± globose conidia up to 1.5 µm in diameter, almost filling the ascus.

Paraphyses hyaline, filiform, branched, septate, slightly enlarged above at the apices up to 1.5 µm wide, projecting up to 25 µm beyond the tips of the asci.

Habitat. - On dead angiosperm log.

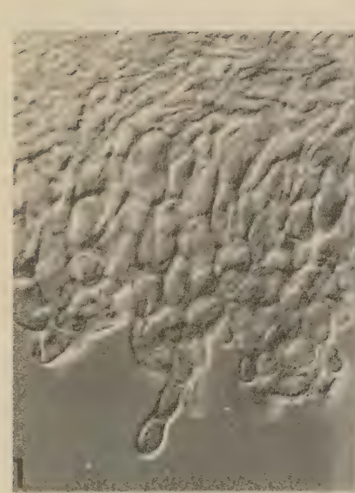
Specimens examined. - Angiospermous forest, Yusipang (Alt. 3350 m), Thimphu, Bhutan, R. Sharma, September 21, 1980, PAN 17536; part of this collection is also deposited in the senior author's personal herbarium (W.R.A. 1982-307).

NOTES. - The senior author studied a slide of the type specimen of the forma of Ciboria peckiana (Cooke) Korf f. gigaspora (Korf) Korf (= Rutstroemia macrospora (Peck) Kanouse f. gigaspora Korf; cf. KORF 1959, 1971; CUP-JA No. 3), which matches our specimen in its anatomical characters rather well, although in the ectal excipulum of the Himalayan specimen the cell walls are browner than in the type of the forma. Furthermore in the type specimen there are no conidia, which are budded off by the ascospores. Nevertheless we consider both specimens identical at the moment. Our specimen differs from the typical Ciboria peckiana (Cooke) Korf (= Rutstroemia macrospora (Peck) Kanouse) by its smaller and different coloured apothecia and the larger ascospores.

Plate 18

CIBORIA PECKIANA (Cooke) Korf f. GIGASPORA (Korf) Korf
PAN 17536

Fig. 1, 2: LS showing ectal excipulum; 630 x, 1000 x, respectively, DIC.
Fig. 3: LS, margin; 1000 x, DIC.
Fig. 4: LS, medullary excipulum; 630 x, DIC.
(photos: W.R. Arendholz)



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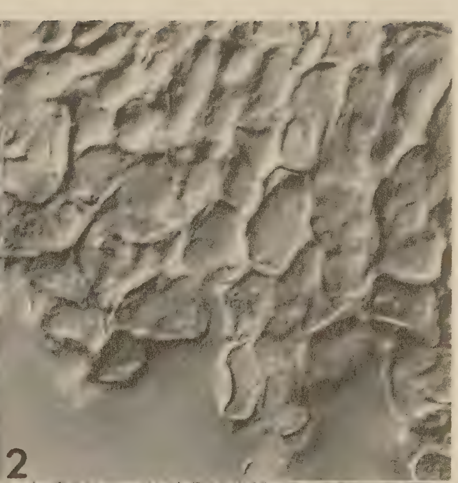

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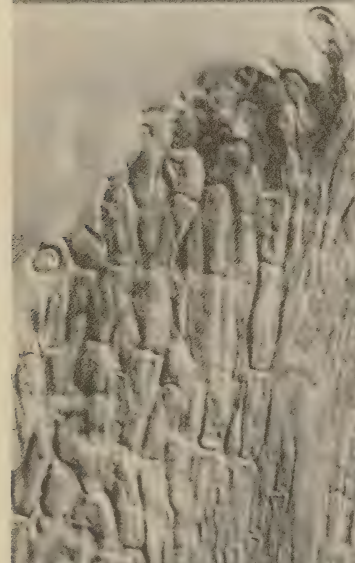

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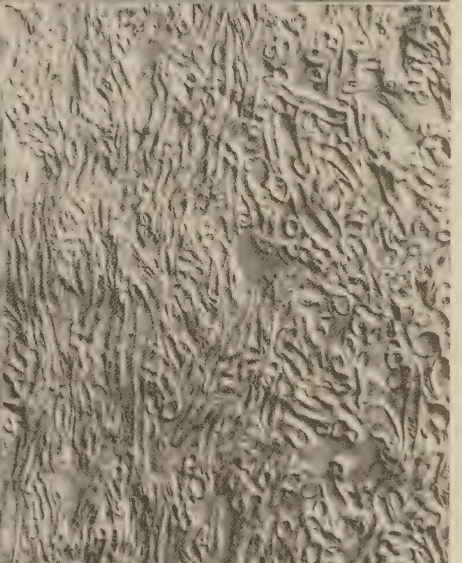

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Because of the conflicting application of the name Rutstroemia (cf. e.g. DUMONT (1972), HOLM (1976) and KOHN & SCHUMACHER (1983)) one can class Ciboria peckiana f. gigaspora with Rutstroemia, if one interpret this genus in the sense of REHM (1893)) NANNFELDT (1932), WHITE (1941) and DENNIS (1978). For that reason we do not establish a new species. Hence the membership of this specimen remains open until a modern revision of this genus will be available.

Already earlier THIND & H. SINGH (1969) recorded Ciboria peckiana (as Rutstroemia macrospora) from India, but they did not find any septate ascospores in their specimens.

ACKNOWLEDGEMENTS

The senior author is pleased to acknowledge the valuable comments of Prof. Dr. R.P. Korf, Cornell University. Furthermore he wishes to express his thanks to his wife Traute, who, in spite of the stress by our two little children, wrote the French summary in reliable manner, and to Mrs. E. Miesel, who typed the camera-ready manuscript.

The junior author is thankful to Prof. K.S. Thind for encouragement and guidance. He also acknowledges the financial support from the Department of Science and Technology (DST).

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FLAVOPUNCTELIA, A NEW GENUS IN THE PARMELIACEAE (ASCOMYCOTINA)

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Abstract.--Parmelia flaventior Stirton and related lichen species are recognized as a new genus, Flavopunctelia (Krog) Hale, based chiefly on conidial and chemical characters. The following new combinations are made: Flavopunctelia darrowi (Thomson) Hale, F. flaventior (Stirton) Hale, F. praesignis (Nylander) Hale and F. soredica (Nylander) Hale.

Krog (1982a) recently proposed a new genus, Punctelia, to accomodate a small group of pseudocyphellate parmelias formerly classified as Parmelia sect. Parmelia subsect. Simplices Hale & Kurokawa (Hale & Kurokawa, 1964). It had long been known that the pseudocyphellate parmelias, which also include the Parmelia saxatilis and P. flaventior groups, were heterogeneous, with significant differences in chemical evolution and structure of the pseudocyphellae (Culberson, 1962; Hale, 1981).

There were cogent reasons for recognizing Punctelia, including a unique conidial type (unciform in most species), open punctiform pseudocyphellae and uniform medullary chemistry, predominantly two depsides, gyrophoric and lecanoric acids, as well as some fatty acids, and atranorin in the cortex.

Krog also placed in this otherwise very homogeneous genus the well-known P. flaventior group (Hale, 1980). These species (P. darrowi Thomson, P. flaventior Stirton, P. praesignis Nylander and P. soredica Nylander) have strongly bifusiform conidia and usnic acid in the cortex. Except for P. soredica, they are also much larger than any Punctelia species.

Conidia are now being recognized as one of the more important characters in the Parmeliaceae at the generic level (Krog, 1982b). As a matter of fact, the P. flaventior group is more closely related in this respect to Parmelia sensu stricto than to Punctelia. Parmelia has at least a few species with weakly bifusiform conidia (most are cylindrical), but differs from other parmelias in having depsidone chemistry and effigurate pseudocyphellae (Hale, 1981).

Chemistry is an important correlating character. While Krog (1982a) denies any value to cortical chemistry at the generic level (in the Parmeliaceae atranorin versus yellow usnic acid) there is in fact no agreement among lichenologists on the use of this character nor any experimental or genetic proof that has been introduced to deny its potential value. The fact remains that no Punctelia species with unciform, cylindrical or filiform conidia contain usnic acid, whereas all species in the Parmelia flaventior group do. A number of other lichen genera are based in part on highly correlated cortical chemistry: Bulbothrix Hale (atranorin) and Relicina (Hale & Kurokawa) Hale (usnic acid), Bryoria Brodo & Hawksworth (brown pigments) and Alectoria Acharius (usnic acid), and Cetrariastrum Sipman (atranorin) and Hypotrachyna (usnic acid or atranorin).

Another chemical feature that can be used is the correlation between medullary chemistry and the color (carbonization) of the lower cortex. In Punctelia lecanoric acid is confined to species with a pale lower cortex, gyrophoric acid to those with a black lower surface (Hale, 1965). In Parmelia flaventior the reverse is true: Lecanoric acid occurs with a black lower surface. Other chemical features include the apparent absence of fatty acids in the P. flaventior group but the presence of lichenin, which is lacking in both Punctelia and Parmelia sensu stricto (Common & Imshaug, in litt.).

I would propose that the Parmelia flaventior group be recognized as a distinct genus, based primarily on conidial and chemical characters, as follows. Details on the taxonomy and distribution of the species can be found in Hale (1980).

Flavopunctelia (Krog) Hale, comb. et stat. nov.
Punctelia subgenus Flavopunctelia Krog, 1982a, p. 291. Type species: Parmelia flaventior Stirton.

This new genus contains four species as follows:

Flavopunctelia darrowi (Thomson) Hale, comb. nov. Basionym: Parmelia darrowi Thomson in R. A. Darrow, Amer. Midl. Nat. 43: 493. 1950.
Flavopunctelia flaventior (Stirton) Hale, comb. nov. Basionym: Parmelia flaventior Stirton, Scot. Nat. 4: 254. 1877-78.
Flavopunctelia praesignis (Nylander) Hale, comb. nov. Basionym: Parmelia praesignis Nylander, Bull. Soc. Linn. Norm., ser. 2, 6: 270. 1873.
Flavopunctelia soredica (Nylander) Hale, comb. nov. Basionym: Parmelia soredica Nylander, Flora 68: 605. 1885.

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REVUE DES LIVRES

par

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Book Review Editor, Croix du Sud 3, B-1348 Louvain-la-Neuve
Belgique

A TAXONOMIC STUDY OF THE LICHEN GENUS MICAREA IN EUROPE, by Brian John COPPINS, Bulletin of the British Museum (Natural History) Botany series, 11 (2) : 1-214, 57 fig., 28 maps, 8°, paperback, 1983. British Museum (Natural History), Cromwell Road, London SW7 5BD. Price £ 27.75.

Fourty five species are recognized in the apothecial lichen genus *Micarea*, of which 31 are confirmed from Britain. Seven species are described as new : *M. adnata, M. curvata, M. hedlundii, M. muhrii, M. nigella, M. olivacea* and *M. myriocarpa*. Nine new combinations in *Micarea* are made and two are proposed in *Psilolechia* and in *Bacidia* after exclusion of the species from *Micarea*.

This monograph is of particular interest for the extended study of the morphology of the mycobionts. The apothecial teleomorphs vary in shape, from convex and adnate with or without excipulum to stipitate with well developped excipulum or convex with rooting hypothecium. They are accompagnied in 39 species by one, two or three distinct anamorphs with micro-, meso- and macrophialidic conidia.

The pycnidial anamorph can be stalked and grouped up to three on the same stalk. In one species *M. adnata* , a sporodochial anamorph is present beside the pycnidial anamorph. Furthermore, three types of conidia are observed, differing not only in size , but also in shape such as oblong to scoleocoid or helicoid. There have been indeed little emphasis on the conidial lichen-forming fungi up to the most recent years. The author considers however the conidial anamorphs as a taxonomic character in *Micarea*.

MATSUSHIMA MYCOLOGICAL MEMOIRS N°3, by Takashi MATSUSHIMA, 90 p., fig. 133-243, 8°, paperback, 1983. Matsushima Fungus Collection, 23-19-601, Mikageyamate-2-chome, Higashinada-ku, Kobe, Japan 658.

This third fascicule contains the descriptions and line-drawing illustrations of 77 fungi hyphomycetes collected by the author in Japan, Taiwan, Canada, India, the Pacific Island, Uganda, Seychelles, Argentine Chile, Peru and U.S.A. Amongst those, they are 39 new species, two of them in the new genus *Pseudoramularia, P. ponapensis* and *P. ruwenzoriensis*. This fascicule shows the same quality as the previous ones in the series. We noticed, in Mycotaxon 13 (1) : 280, 1981, the author's wonderful ability and effeciency. The descriptions are just what is needed and the excellent full page drawings speak more than words.

MATHEMATICAL METHODS IN THE TAXONOMY OF FUNGI, by A. RAITVIIR, Scripta mycologica II, 57 p., 6 fig., in 12, paperback, 1983. Institute of Zoology and Botany, Academy of Sciences of the Estonian SSR, Talinn, ESSR. Price KOL. 35.-

Short paper demonstrating the mathematical method in distinguishing very affine species or exploring the internal structure of a particular taxon on the fungi. The author takes on one hand *Albotricha pallida* and *A. orientalis* and on the other hand, species of the genus *Belonidium* and some related species, *Belonidium leucophaeum, B. elegantulum, B. remmii, B. leucostomum, B. eupatorii, Scutellinia scutellata* and *S. subhistella*. A long bibliography on the subject is provided.

ILLUSTRATED GENERA OF RUST FUNGI, by G.B. CUMMINS and Y. HIRATSUKA, rev. ed., 152 p., ill., 4°, spiral binding, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, U.S.A.

This manual is the second edition of *Illustrated Genera of Rust Fungi* published in 1959 and describes 105 genera of Uredinales, i.e. 10 more than in the first edition. It is designed to provide a rapid aid to the identification of rust fungi. The line-drawings characterizing each genus may have an important role in a rapid approach of the identification. The genera are keyed out in thirdteen sections based on the telia and teliospore characters and are arranged according to the morphological affinities.

Each generic description contents a diagnosis, the mention of the type species, comments on the host relation ships, references and one line-drawing. It is a practical guiding book.

ATLAS OF AIRBORNE SPORES IN EUROPE, by S.T. NILSSON, 150 p., 10 fig., 88 pl., 4°, bound, cloth., 1983. Springer-Verlag, Heidelberg Platz 3, D-1000 Berlin 33, Germany. Price DM 128.-, US $ 54.-

This is a very interesting compendium of mostly scanning electron micrographs of airborne spores of fungi from E. Grafström, J. Keller, E. Kiffer, H. Lundström, J. Perreau, O. Reisinger and the author.

The illustration is arranged taxonomically representing 87 species in Myxonmycetes, Basidiomycetes, Zygomycetes, Ascomycetes and Deuteromycetes. An introductive text recalls the general ontogeny of spores in the different groups of fungi. A short description of each species is added. A record of airborne fungi in some agricultural and industrial sites is also reproduced.

ULTRASTRUCTURE OF THE ROOT-SOIL INTERFACE, par R.C. FOSTER, A.D. ROVIRA et T.W. COCK, 168 p., 118 electron. microphotos, 6 fig., 4°, cartonné toilé, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, U.S.A. Price US $ 32.- (APS members), 36.- (non members).

Ce livre est un atlas, l'illustration d'un site naturel caché, la rhizosphère, carrefour d'une multitude de sciences : la microbiologie du sol, la physiologie végétale, la physique du sol, la pathologie des plantes, l'écologie et les études ultrastructurales de la cellule.

L'interface racine-sol est, en effet, à la fois un lieu fascinant et mystérieux et un attirant objet de recherche. Les auteurs nous le visualisent par de bonnes SEM microphotographies du sol, de la racine, des bactéries et champignons rhizosphériques et du comportement des cellules radiculaires. Les exemples donnés sont le plus souvent la rhizosphère du *Triticum*, *Paspalum*, la mycorrhize de *Pinus* et *Gaeumannomyces graminis*, l'agent du"take-all" des graminées.

De quelques photographies, sans doute pas assez nombreuses, les auteurs donnent une transcription graphique aidant beaucoup la compréhension.

FUNGAL MORPHOLOGY AND ECOLOGY - MOSTLY SCANNING ELECTRON MICROSCOPY, by A. TSUNEDA, 320 p., 624 fig., 142 ph. pl., 4°, hardcover 1983. The Tottori Mycological Institute, 211 Hirohata, Kokoge, Tottori, 689-11 Japan. Price ¥ 6000.-, US $ 25.-

This book is not just an atlas, but a generously illustrated handbook of Mycology. In an introductive chapter, the fungal cell and vegetative structure of fungi are described. In the second chapter (204 p.) on the taxonomy and morphology of fungi, Dr. Tsuneda describes the morphology, the anatomy, the taxonomic position, the life cycle, the sporogenesis and method of spore discharge in each division, class and order of the Mycota. Fungi belonging to the Hyphomycetes are classified according to their conidium ontogeny.

The text is abundantly illustrated with line-drawings and mostly scanning electron micrographs of first quality. Furthermore, the technical terms are didactically pointed out by bold-faced printing.

The third chapter (about 100 p.) dealing with the ecological life features in the fungi makes this manual particularly interesting. The saprobic and parasitic life and the fungal succession on the natural substrate, the interaction between fungi and other organims such as commensalism, mutualism, paratitism, depredation and the survival in diverse condition by production of chlamydospores, sclerotia or rhizomorphs are described and singularly illustrated.

This mycology manual is very attractive and scientific. The life show of the fungus in its natural site as illustrated makes the text fully accessible to the student.

ZOOSPORIC PLANT PATHOGENS, A MODERN PERSPECTIVE, édité par S.T. BUCZACKI, X + 352 p., 50 fig., 8°, relié, cartonné, 1983. Academic Press, 24-28 Oval Road, London NW1 7DX, U.K. Price £ 33.-, US $ 54.50.-

A part la monographie des Pythiacées par Mathews (1931) et celle des Saprolégniacées par Karling (1942), aucun ouvrage sur les champignons phytopathogènes à zoospores n'a encore été publié avant celui-ci. Cet ouvrage de BUCZACKI n'a pas la prétention d'être une monographie, mais seulement une série de textes sur la taxonomie, la structure, la biologie, la pathogénicité et le contrôle de ces champignons.

Ces textes, en guise de chapitres, sont en partie des revues de connaissances expérimentales acquises mais aussi - et c'est ce qui fait l'originalité et l'intérêt de ce livre - une réflexion souvent poussée sur ce groupe de champignons, sa nature, sa place dans le monde vivant, son dynanisme interne génétique, physiologique, biochimique, son écologie et son rôle pathogénétique, sans perdre le point de vue d'une absolue nécessité de méthodes de lutte rénovées.

Sont-ce des algues, des protistes ou des champignons ? Que peuvent nous apprendre les études ultra-structurales de la cellule flagellée ? Quels sont les mécanismes génétiques de sélection de mutants résistants mis en jeu par les traitements de lutte chimique ? Comme chez les espèces de *Phytophtora* ? Quel est le spectre phytopathogénétique complet des Pythiacées seules ou en association à d'autres pathogènes ? Quelles sont les promesses de la lutte chimique et d'une lutte biologique? Dans quelles directions faut-il orienter la recherche pour y parvenir ? Autant de questions posées et répondues par les auteurs. Trois appendices parlent de la validation du nom de classe Hyphochytriomycètes, des méthodes d'étude des champignons phytopathogènes à zoospores et de la taxonomie de leurs 29 genres.

A REVISED LIST OF THE AGARICOID AND BOLETOID BASIDIOMYCETES FROM INDIA AND NEPAL, par B. MANJULA, repris de Proccedings of the Indian Academy of Sciences (Plant Sci.) 92 (2) : 81-213, 1983. Obtenable de l'auteur, Center for Advanced Studies in Botany, University of Madras, Madras 600 005, India.

Ce tiré-à-part mérite d'être signalé parce qu'il constitue une révision des récoltes d'Agaricales des Indes et du Népal faites par J.D. Hooker et décrites par Berkeley, en fonction de la taxonomie moderne des Agaricales. Cette révision réalisée après réexamen des 109 matériaux types déposés aux Royal Botanic Gardens de Kew est présentée dans la première partie, avec redescriptions, illustrations et commentaires. Dans la deuxième partie, l'auteur met à jour la nomenclature des basidiomycètes agaricoïdes et boletoïdes des Indes et du Népal précedemment compilés par Butler et Bisby (1931), Mundkur (1938) Vasudeva (1960) et d'autres. L'auteur y ajoute encore des clés pour les principaux genres et la mention de nombreuses récoltes récentes. Cette contribution est donc la dernière à la liste *The Fungi of India*.

HYPHOMYCETES, TAXONOMY AND BIOLOGY, par C.V SUBRAMANIAN, xiv + 502 p., 19 portraits, 8°, relié toilé, 1983. Academic Press, 24-28 Oval Road, London NW1 7DX. England. Price £ 35.-, US $ 65.-

"Nothing is completed, but ever completing". Ces mots de Carlyle par lesquels l'auteur commence modestement son livre montrent combien il ressent la mycologie dans son continuel développement, soit à jamais incomplet.

Cependant le livre qu'il nous présente est une captivante histoire de cette partie des champignons, les Hyphomycètes. Il en rappelle d'abord les parents : Micheli, Tode, Persoons, Link, Nees von Esenbeck, Fries, Corda, Preuss, les frères Tulasne, de Bary, Saccardo, Brefeld et tant d'autres de ce siècle.

Il en décrit ensuite le trait de caractère principal, la pléomorphie ayant entraîné la création d'une nomenclature à double face, anamorphique et téléomorphique. Sans doute regrette-t-il que cette pléomorphie ne fut pas d'emblée saisie dans son ensemble. Il revoit alors les classifications successives des Hyphomycètes de Saccardo à ce jour. Il distingue les divers types ontogéniques de conidies et désigne par de nouveaux termes la relation entre la conidie naissante et la paroi de la cellule mère. Il propose un système affiné de classification des Hyphomycètes en 5 ordres et 27 familles dont 9 nouvelles. Il y classe déjà 303 genres dont 19 d'entre eux pourraient être les descendants de 19 genres fossiles d'Hyphomycètes.

Deux formes de libération passive des conidies sont distinguées, celle de la xénoconidie qui est immédiate, et celle de memnoconidie qui est différée.

Dans les 16 chapitres suivants, C.V. Subramanian nous mène à la rencontre de ces Hyphomycètes dans leur habitat, qu'ils y vivent en saprobiotiques ou en parasites. Cet habitat est naturel, les feuilles mortes, les insectes desquels ils sont symbiontes ou parasites, les nématodes, les champignons, le sol, les excréments, l'eau douce, l'eau marine, les plantes qu'ils parasitent, les animaux et l'homme qu'ils rendent malades ou intoxiquent. Il nous les montrent aussi sur des substrats nutritifs que nous leur demandons de transformer industriellement et sur les matériaux qu'ils dégradent mais que nous voulons protéger.

Ces chapitres se lisent si agréablement et sont si riches d'informations qu'on ne saurait assez recommander ce livre, en dehors du cercle des mycologues systématiciens, à toutes les universités et en particulier à tous les laboratoires de microbiologie, de phytopathologie, d'écologie et de sciences des matériaux.

FUNGAL METABOLITES II, par W.B. TURNER et D.C. ALDRIDGE, x + 631 p., 8°, relié toilé, 1983. Academic Press, 24-28 Oval Road, London NW1 7DX, England. Price £ 44.00, US $ 80.00.-

Ce livre apporte la mise à jour du volume I paru en 1971. L'arrangement des articles et des rubriques est le même que celui du volume I et dès lors seules les rubriques revues et les nouvelles rubriques apparaissent ici. Les deux premiers chapitres sur les métabolites primaires et secondaires des champignons et leurs productions de métabolites secondaires parus dans *Fungal Metabolites I* n'ont pas nécessité de mise à jour. Par contre, les 7 chapitres suivants reflètent les développements importants de la recherche depuis 12 ans. Ils traitent de 1558 métabolites fongiques secondaires produits sans intervention d'acétate (chap. 3), dérivés d'acides gras (4), des polycetides (5), des terpènes et des stéroïdes (6), des métabolites secondaires de dérivés de l'acide cyclotricarboxylique (7), dérivés des acides aminés (8) et de ces autres métabolites tels que les cytochlasines, les composés volatiles et les nouveaux produits encore non classifiés (9).

Les noms des espèces productrices sont mentionnés ainsi que les voies intermédiaires ou les conditions de production. Aux listes des 2564 références s'ajoutent un index des formules et noms chimiques et un index des noms d'espèces. Ce livre montre l'extraordinaire biochimie des champignons et justifie l'intérêt croissant qu'y apporte l'industrie.

MYCORRHIZAL SYMBIOSIS , par J.L. HARLEY et S.E. SMITH, x + 483p., 36 fig., 8°, relié toilé, 1983. Academic Press, 24-28 Oval Road, London NW1 7DX, England. Price £ 35.00, US $ 59.50.-

Dans une première partie, les auteurs décrivent tout ce qui est connu sur les types les plus courants de mycorhizes : les encomycorhizes vesiculo-arbusculaires, les ectomycorhizes, les ectendomycorhizes des conifères, les mycorhizes éricoïdes, les mycorhizes arbutoïdes et monotropoïdes et les mycorhizes d'orchidées. Pour chaque type, les auteurs insistent sur les connaissances acquises sur les transferts des nutrients du sol.

Dans une seconde partie, les auteurs exposent les méthodes et résultats de recherche dans l'identification et la synthèse mycorhizique et dans l'analyse des transferts des substances par l'intermédiaire du champignon.

Les auteurs disent ne pas avoir été exhaustifs dans les matières traîtées, mais avoir plutôt cherché à communiquer leur expérience personnelle. Cependant, ils font référence, dans le texte, à près de 1100 références bibliographiques.

Le texte est dense et donc moins accessible qu'il serait souhaitable. Cependant, dans ce domaine qui connaît de plus en plus d'activités de recherche, ce livre apporte à la fois la synthèse et l'expérience de spécialistes tant attendues par les chercheurs.

PILZE, EINE EINFÜHRUNG, by John WEBSTER, translation B.D. EPP, xviii + 641 p., 332 fig., 8°, paperback, 1983. Springer Verlag, Heidelberger Platz 3, Postfach, D-1000 Berlin 33, Germany. Price DM 118.00, US $ 48.80.-

Prof. Karl Esse, in the preface of his translation, welcome it for the extensive scope on the mycological field treated by Webster and for the quality of the translation.

Surely, the treatise of Prof. Webster is excellent not only in the taxonomical structure and description of the fungi, but also in the physiological biochemical and also usable or nocive proprieties of the fungi. It is therefore a broad and precise introduction to mycology. The traduction is indeed good with here and there, some improvements, such as the indication of the rank of class and subclass by name instead of by number. The editor must also be congratulated, particularly for the presentation of the illustrations. The photographs are well contrasted. The line-drawings are printed in such a way and larger size as to give the original first quality.

AINSWORTH and BISBY'S DICTIONARY OF THE FUNGI, par D.L. HAWKSWORTH, B.C. SUTTON et G.C. AINSWORTH, 7th Ed., Commonwealth Mycological Institute Publication, xii + 445 p., 14 fig., 16 pl., relié toilé, 1983. Commonwealth Agricultural Bureaux Farnham House. Farnham Royal, Slough SL2 3BN U.K. Price £ 12.50, US $ 26.25.-

Cette nouvelle édition du *Dictionary of the Fungi* remplace celle de 1971. Elle comprend cette fois 16.500 entrées.

Ce dictionnaire est devenu un livre indispensable à tout mycologue et microbiologiste. Il constitue la liste la plus complète des noms de genres déjà au nombre de 11.225. Pour chacun d'entre eux, l'auteur (leurs citations mises à jour selon le nouveau code), la date, le statut, la position taxonomique, le nombre d'espèces, la distribution géographique et une ou plusieurs références bibliographiques sont données.

De plus, tous les noms de rang supérieur au genre, i.e. division, classe, ordre et famille, sont répertoriés et permettent de trouver un aperçu de la classification à l'intérieur du taxon.

Tous les termes, substantifs et épithètes usités en mycologie et lichénologie descriptives et en nomenclature sont expliqués, voir illustrés. Même des termes aussi généraux que "fungi", "lichens", "number of fungi", "classification", "author's name", "nomenclature", "collection and preservation", "state of fungi", "colour", "methods", "Latin", sont des voies vers une très large information étayée de références bibliographiques. De même, toutes les catégories écologiques de champignons évidentes en soi, telles que "soil fungi", "aquatic fungi" "wood attacking fungi", sont des sources à exploiter.

Non seulement bon nombre de rubriques générales telles que biodétérioration, air pollution, allergy, medical mycology etc., sont présentes, mais aussi un certain nombre de substances précises, antibiotiques, mycotoxines, métabolites, enzymes.

Des coquilles d'imprimerie existent, et quelques erreurs dans l'information ont été repérées. Les auteurs demandent qu'elles leur soient signalées.

L'impression en deux colonnes est une nette amélioration de l'ancienne édition.

PROCEEDINGS OF THE THIRD INTERNATIONAL CONFERENCE ON CULTURE COLLECTIONS, ed. par F. FERNANDES et R.C. PEREIRA, xxiii + 283 p., 8°, toilé relié, 1977. University of Bombay, Fort, Bombay 400032, India. Prix RS 102.00, US $ 12.00.-

Ce volume rend compte de la 3ième conférence internationale sur les collections de cultures organisée par la Fédération Mondiale des Collections de Cultures. De nombreuses autorités de la microbiologie y ont débattu du rôle vital des collections de cultures de microorganismes, de cellules et d'autres dans le développement de la microbiologie fondamentale et appliquée.

La constitution de banque de données de microorganismes est à l'ordre du jour, à la fois pour la gestion de la collection et la diffusion d'un catalogue. Le système de codage de Krichevsky, et l'application de la taxonomie numérique sont discutés aussi bien pour l'identification que pour le catalogue. Les méthodes de maintenance et de préservation, en particulier sans azote liquide, comme aussi la caractérisation rapide des métabolites de microorganismes font aussi l'objet de délibération. Le développement des collections de cultures dans les pays en développement est une importante préoccupation de la communauté microbiologique. Enfin, la place des grandes fédérations nationales et internationales de collections de cultures est précisée en vue de la définition d'une politique de développement, de soutien et de bonnes relations.

PROCEEDINGS OF THE EIGHTH CONGRESS INTERNATIONAL SOCIETY FOR HUMAN AND ANIMAL MYCOLOGY, Massey University, New Zealand, 1982, ed. par Michael BAXTER, xx + 571 ., 4°, dos papier, 1983. Ed. Dr. Micheal Baxter, Veterinary Faculty, Massey University, Palmerston North, New Zealand.

Ce congrès réunit 214 spécialistes de la Mycologie médicale et vétérinaire de 27 pays. Les 105 communications ont porté sur de multiples sujets et descriptions de cas regroupés dans les thèmes suivants : la taxonomie des champignons pathogènes, l'écologie et l'épidémiologie des infections fongiques, la pathologie et l'histopathologie des infections fongiques, l'opportunisme des champignons pathogènes, les aspects cliniques des mycoses, l'immunologie et la sérologie des infections fongiques et enfin les mycotoxines dans les mycotoxicoses et les mycoses.

Dans le domaine taxonomique, Ajello fit le point des progrès réalisés. La reconnaissance d'espèces difficiles par des méthodes serologiques, la caractérisation des dermatophytes, la définition de la pléoanamorphie des champignons pathogènes ont été à l'ordre du jour.

La pathogénécité et l'épidémiologie de champignons banaux du sol de jardin et du bois pourrissant en forêt, ont été mises en évidence. Il serait souhaitable que l'intérêt de tous les mycologues puisse s'étendre à ces domaines de la mycologie médicale et vétérinaire. En effet, il n'y a pas deux sciences mycologiques, l'une pathologique, l'autre pas, mais une seule science à implications multiples auxquelles le mycologue se doit non seulement d'être ouvert, mais aussi de collaborer.

RAY FUNGI, HIGHER FORMS. I BIOLOGY AND CLASSIFICATION. II CLASS ACTINOMYCETES (PART I AND II), par N.A. KRASSILNIKOV, vol. I, xiv + 265 p., 53 fig., vol. II 1-2, xii + 1252 p., 186 fig., 8°, relié toilé, published for the USDA Agricultural Research Service and National Science Foundation, Washington, by Amerind Publishing Co, New Delhi, 1981. National Technical Service, U.S. Dept. Commerce, Springfield, Virginia 22161, USA.

Cet ouvrage est la traduction anglaise de l'édition originale parue à Moscou en 1970. C'est la deuxième monographie publiée par l'auteur sur les *Ray Fungi*. La première monographie publiée en 1938 comprenait les actinomycètes, les proactinomycètes, les mycobactéries et les mycocoques.

L'auteur définit les *Ray Fungi* comme ayant un mycélium ou des formes en bâtonnets ou coques, à mycélium septé ou non, et, chez les *Higher Ray Fungi*, à organe spécial de fructification (Actinomycètes, *Micromonospora*, *Actinopycnidia*, *Microbiospora*, *Streptosporangium* et autres) et , chez les *Lower Ray Fungi*, à simple division (*Mycobacteria*, *Mycococci* et autres).

Les Actinomycétales ou *Higher Ray Fungi* ont parfois été considérés comme *Fungi imperfecti*, mais sont encore souvent envoyés au mycologue pour identification. En effet, leur morphologie filamenteuse et leur sporogénèse ressemble beaucoup aux plus petits hyphomycètes à arthroconidies en chaîne.

Ces microorganismes sont le plus souvent saprobiotiques du sol, mais peuvent aussi être pathogènes. Leur intérêt réside aussi dans leurs propriétés antibiotiques et enzymatiques.

Le 1er volume traitait de la morphologie et de la reproduction, de la physiologie et de la culture, des activités enzymatiques et des biosynthèses de métabolites divers et enfin de leur écologie et de leur classification. Le deuxième volume concerne la description taxoomique des Actinomycètes.

MYCOTAXON

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NOTICE

INVITATION TO JOIN NOMENCLATURE SUBCOMMITTEES

The Special Committee for Fungi & Lichens of the International Association for Plant Taxonomy invites all interested botanists to join one or more of their new working subcommittees on proposals for changes in the International Code of Botanical Nomenclature. Four subcommittees will begin work immediately, and exchange comments by mail. The work of the subcommittees will need to be completed by January 1986 if changes are to be enacted at the 1987 International Botanical Congress. Readers interested in serving on subcommittees should so advise the convener of the subcommitee(s):

SUBCOMMITTEE A: (Taxa that may be treated in different taxonomic groups now specified under Art. 13.1(d) when such groups have different sanctioning authors) Convener: Dr. Vincent Demoulin, Département de Botanique, Université de Liège, Sart Tilman, B-4000 Liège, BELGIUM.

SUBCOMMITTEE B: (Citation and transfer of sanctioned names under Art. 13.1(d) and Rec. 50E.2) Convener: Dr. David L. Hawksworth, Commonwealth Mycological Institute, Ferry Lane, Kew, Richmond, Surrey TW9 3AF, ENGLAND.

SUBCOMMITTEE C: (Other problems with Art. 13 and the starting-point for nomenclature of fungi and lichens, and with Art. 59 on pleomorphic fungi) Convener: Dr. Walter Gams, Centraalbureau voor Schimmelcultures, P.O. Box 273, 3740 AG Baarn, THE NETHERLANDS.

SUBCOMMITTEE D: (Fossil Fungi) Convener: Dr. Don R. Reynolds, Natural History Museum, 900 Exposition Boulevard, Los Angeles CA 90007, U.S.A.

(Prepared by: Richard P. Korf, Secretary, IAPT Special Committee for Fungi and Lichens, Plant Pathology, Cornell Univ., Ithaca NY 14853 USA.)

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ERRATUM, VOLUME FIFTEEN

Page 53, line 13: for MCYORRHIZAL read MYCORRHIZAL

ERRATA, VOLUME SIXTEEN

Page 187-189: throughout for *eickerii* read *eickeri*
501, line 37: for *campbelli* read *campbellii*

ERRATA, VOLUME EIGHTEEN

Page 446, line 24: for *caledonium* read *caledonicum*
447 9: for *caledonium* read *caledonicum*
452, line 16: *for* and membranous walls *read* and walls

ERRATUM, VOLUME NINETEEN

Page 294, line 33: for tennuifōlium read tenuifolium

ERRATA, VOLUME TWENTY

Page 13, line 42: for *Sphaeria* read *Psilosphaeria*
145 1: *for* ochrolecuum *read* ochroleucum
148 35: for xylostromatioides read xylostromatoides
150 38: for T. caesius read Tyromyces caesius
330 42: for *membrancea* read *membranacea*
336 29: for *Coriolopsis cognatus* read *Coriolopsis cognata*
46: for *Coriolopsis substuppeus* read *Coriolopsis substuppea*
337 35: for *arcularis* read *arcularius*
338 27: for *Bondartzewia berkleyii* read *Bondarzewia berkeleyi*
339 17: for *perrottettii* read *perrottetii*
40: for *Bondartzewia berkleyii* read *Bondarzewia berkeleyi*
352 36: *for* pyrrohocreas *read* pyrrhocreas
353 36: for *Physosporinus rivulosa* read *Physosporinus rivulosus*
358 6: for *Coriolopsis substuppeus* read *Coriolopsis substuppea*

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